

Prepared For



Lake Charles Regional ITS Architecture

Prepared By



July 2011

STATE PROJECT NUMBER: 4400000633
TASK ORDER 701-65-1403
FEDERAL AID PROJECT NUMBER: ITS-9908(541)
ITS ARCHITECTURE (NEW AND UPDATES)

LAKE CHARLES REGIONAL ITS ARCHITECTURE

Presented to:



Prepared by:



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1 Introduction

This document describes the Intelligent Transportation System (ITS) architecture for the Lake Charles region. This architecture conforms to Federal Highway Administration (FHWA) Final rule 940 part 11 which mandates that projects planning to use Federal Funds in their ITS deployments must have established an ITS Architecture for the region. ITS regional architectures have been promoted by the United States Department of Transportation (USDOT) as a tool for describing, using a standard vocabulary and set of concepts, for regional deployments to aid in the integration of User Services and Market Packages to address regional transportation problems. Regional ITS Architectures are also used to constrain projects, funded by the FHWA using high technology products, to highway or transit applications.

1.1 Background

What are Intelligent Transportation Systems or ITS? Simply put, they are the application of technology to highway or transit applications. The formal description is as follows:

“ITS improves transportation safety and mobility and enhances productivity through the use of advanced information and communications technologies. Intelligent transportation systems (ITS) encompass a broad range of wireless and wire line communications-based information and electronics technologies. When integrated into the transportation system's infrastructure, and in vehicles themselves, these technologies relieve congestion, improve safety and enhance American productivity.”

To effectively apply ITS to highway and transit projects, the National ITS Architecture, initiated in 1991 and sponsored by USDOT, is used to describe a wide range of likely ITS applications, using high technology products, for highway and transit projects. In 2001, the FHWA and Federal Transit Administration (FTA) established 23 Code of Federal Regulations (CFR) 940 part 11 which required agencies using federal funds to establish ITS Architectures for their regions. The architecture must contain the following elements:

- 1) Description of the region – Section 3.2
- 2) Identification of the participating agencies and other stakeholders – Section 5
- 3) Roles and responsibilities of the participating agencies and other stakeholders – Section 9
- 4) Agreements needed for operation – Section 13
- 5) System functional requirements – Section 11 (*also see* the Lake Charles Regional ITS Architecture Turbo Architecture source file)
- 6) Interface requirements and information exchanges with planned and existing systems – Appendix B
- 7) Identification of applicable standards (ITS Standards) – Section 12
- 8) Sequence of projects necessary for implementation traceable to a portion of the regional architecture – Section 9.1

The products derived from architecture development processes provide a number of benefits to the transportation planners and engineers. The following are examples of these benefits:

- 1) Establishes a common terminology for the various ITS elements needed to implement and operate ITS applications.
- 2) Defines those elements and the functions they perform, and identifies, in theory, all of the possible interrelationships among the ITS elements.

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- 3) The National ITS Architecture does not dictate a specific approach to implementing or operating any ITS application. Rather, it provides a common set of terms and concepts that local ITS implementers are encouraged to utilize in describing their specific ITS activities.
 - 4) Provides a “living” planning document that promotes modularity, integration, and minimizes impacts when needs to regional issues change.
 - 5) Promotes a thorough, coordinated, and multi-jurisdictional “systems” approach to ITS and the use of a Systems Engineering process to its deployment.
 - 6) Fosters the utilization of the “standards” that are being developed through the USDOT National ITS Architecture program.

2 Acronyms and Abbreviations

ASC – Actuated Traffic Signal Controller
ATIS – Advanced Traveler Information Systems
CAD – Computer Aided Dispatch
CCTV – Closed Circuit Television
CFR – Code of Federal Regulations
CMU – Conflict Monitor Units
CORBA – Common Object Request Broker Architecture
DCM – Data Collection and Monitoring
DMS – Dynamic Message Signs
DOTD – Department of Transportation and Development
ESS – Environmental Sensor Stations
FHWA – Federal Highway Administration
FMS – Field Management Stations
FTA – Federal Transit Administration
GOHSEP – Governor’s Office of Homeland Security and Emergency Preparedness
HAR – Highway Advisory Radio
IMCAL – Imperial Calcasieu Regional Planning & Development Commission
ITS – Intelligent Transportation Systems
LADOTD – Louisiana Department of Transportation and Development
LSP – Louisiana State Police
MAP – Motorist Assistance Patrol
MPO – Metropolitan Planning Organization
MS/ETMCC – Message Sets for External Traffic Management Center Communications
NTCIP – National Transportation Communications for Intelligent Transportation System Protocol
O & M – Operations and Maintenance
OHSEP – Office of Homeland Security and Emergency Preparedness
PCMS – Portable Changeable Message Signs
SCP – Signal Control and Prioritization
SDO – Standards Development Organizations
SSM – Signal System Master
SSL – Signal System Local
TDM – Travel Demand Management
TIM – Traffic Incident Management
TIP – Transportation Improvement Program
TMC – Traffic Management Center
TMDD – Traffic Management Data Dictionary
TSS – Transportation Sensor Systems
USDOT – United States Department of Transportation
XML – Extensive Markup Language

3 Architecture Scope

The Lake Charles Regional ITS Architecture is a roadmap for transportation systems integration. The architecture was developed through a cooperative effort by the region's transportation agencies, covering all modes and all roads in the region. It represents a shared vision of how each agency's systems will work together in the future, sharing information and resources to provide a safer, more efficient, and more effective transportation system for travelers in the region.

The architecture provides an overarching framework that spans all of the region's transportation organizations and individual transportation projects. Using the architecture, each transportation project can be viewed as an element of the overall transportation system, providing visibility into the relationship between individual transportation projects and ways to cost-effectively build an integrated transportation system over time. This chapter establishes the scope of the architecture in terms of its geographic breadth, the scope of services that are covered, and the time horizon that is addressed.

3.1 Timeframe

5 years

3.2 Geographic Scope

The region for which this ITS Architecture is being developed corresponds with the Lake Charles Urbanized Metropolitan Planning Organization hosted by Imperial Calcasieu Regional Planning & Development Commission (IMCAL) with the addition of the I-10 area extended to the Texas state line. See **Figure 1** for the geographic scope limits.

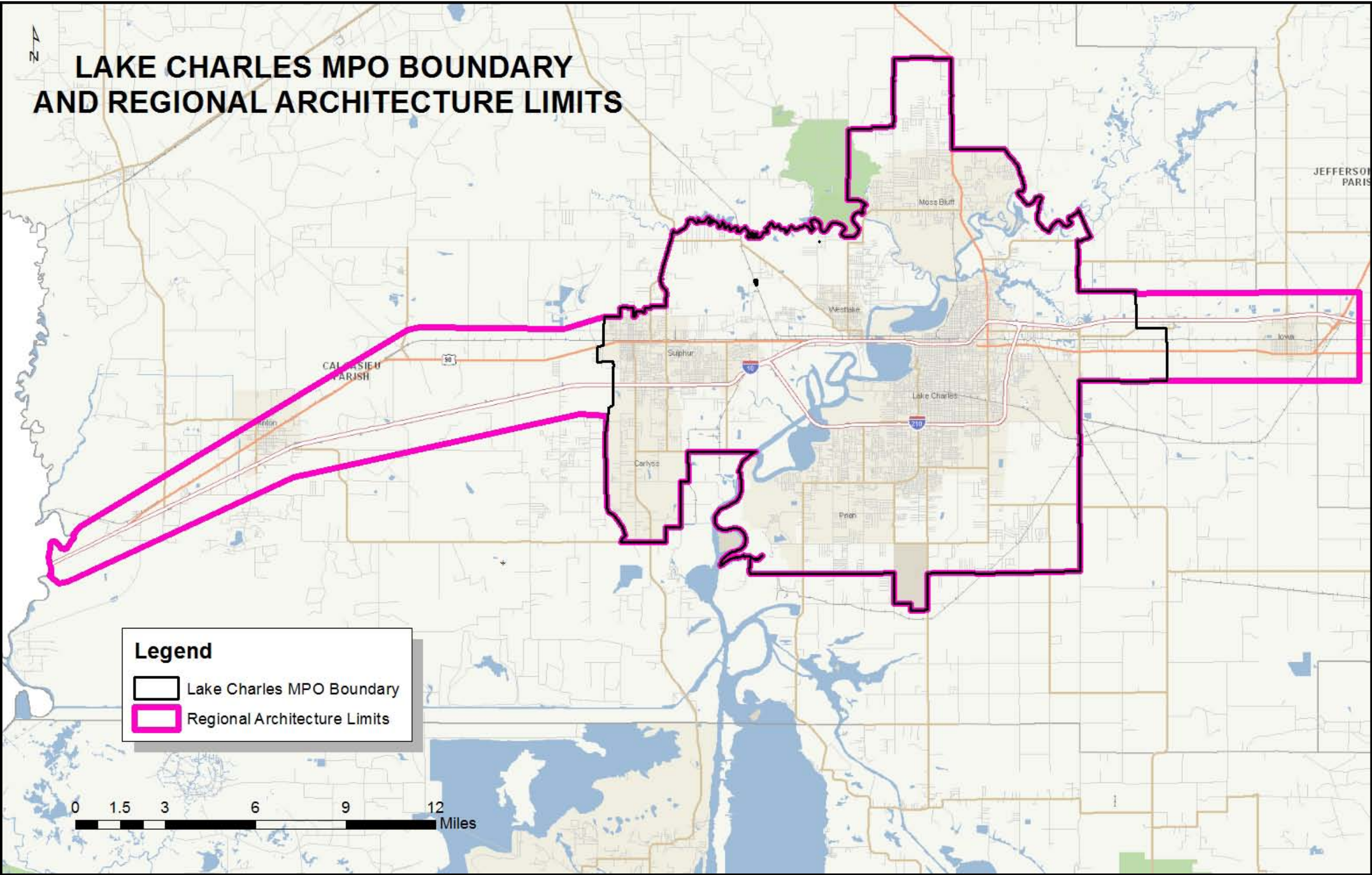
3.3 Service Scope

This regional ITS Architecture covers a range of ITS services for developing a regional ITS architecture. The services are intended to address the Lake Charles region's existing and future ITS needs.

3.4 Maintainer

Louisiana Department of Transportation and Development (LADOTD) with the assistance of IMCAL will maintain the Lake Charles Regional ITS Architecture.

Figure 1: Lake Charles Regional Architecture Boundary



4 Relationship to Planning

The Lake Charles Regional ITS Architecture is an integral part of planning for the operations and maintenance strategies that are addressed by the regional transportation planning process. The architecture provides a framework that connects operations, maintenance objectives, and strategies with the integrated transportation system improvements that are implemented as a progressive series of ITS projects. The architecture is also used to define the data needs associated with performance monitoring that supports an informed planning process. This chapter identifies the planning objectives, strategies, and associated performance measures from the regional plan. These planning elements are connected with ITS services in the Turbo Architecture database.

Table 1: Relationship to Planning

Name	Description	Source	Performance Measure Category	Performance Measure
Increase Mobility	Invest in the development of a regional transportation system that serves to increase the mobility and efficiency of the movement of persons and freight in and through the region.	Lake Charles Urbanized Area Metropolitan Transportation Plan	Capacity	Volume to capacity ratio (v/c)
			Mobility	Vehicle hours traveled (VHT)
			Mobility	Vehicle miles traveled (VMT)
Enhance Safety	Enhance the safety of the transportation system during both normal travel patterns and emergency evacuations. Enhance the security of the transportation system especially related to emergency evacuation from either natural or manmade disasters.	Lake Charles Urbanized Area Metropolitan Transportation Plan	Crashes	Crashes per year
			Crashes	Number of Fatalities
Maintain Existing Infrastructure	Support systematic and coordinated maintenance programs, and make available the adequate resources to preserve existing roadways and transit systems as well as future expansions.	Lake Charles Urbanized Area Metropolitan Transportation Plan		

5 ITS Stakeholders

Identifying stakeholders is an important task in ITS architecture development since effective ITS operations involve the integration of multiple stakeholders and their transportation systems. This section describes the stakeholders who either participated in the creation of the Lake Charles Regional ITS Architecture or whom the participating stakeholders felt needed to be included in the architecture. Some stakeholders have been grouped in order to better reflect mutual participation or involvement in transportation services and elements. Every stakeholder in this section is related to one or more of the transportation inventory elements described in **Section 6**, either as an individual stakeholder or as a member of a stakeholder group.

Table 2: ITS Stakeholders

Stakeholder Name	Stakeholder Description
Calcasieu Parish Police Jury	The Calcasieu Parish Police Jury, one of the primary regional government agencies, is responsible for emergency response and management, and other transportation system management activities within its jurisdiction.
City of Lake Charles	The City of Lake Charles, one of the primary regional government agencies, is responsible for traffic management, incident management, emergency response and management, and other transportation system management activities within its jurisdiction.
City of Sulphur	The City of Sulphur is responsible for traffic management, incident management, emergency response and management, and other transportation system management activities within its jurisdiction.
Imperial Calcasieu Regional Planning and Development Commission	Serves the parishes of Calcasieu, Beauregard, Cameron, Jefferson Davis, and Allen. IMCAL is the Lake Charles area's designated Metropolitan Planning Organization (MPO), which each metropolitan area must have in order to carry out regional transportation planning efforts and receive federal highway funds. As the regional MPO, the IMCAL focuses a great deal of its resources on transportation planning issues and activities. In addition, IMCAL is one of eight sub-state planning and development districts which cover all 64 parishes in the state of Louisiana. IMCAL provides technical assistance for economic development, comprehensive planning, and zoning to its members.
LADOTD	Louisiana Department of Transportation and Development (LADOTD) is an arm of the Louisiana government responsible for state-wide transportation. The LADOTD responsibilities include statewide transportation system operations. This stakeholder group includes all Department of Transportation and Development (DOTD) units (ITS, Office of Planning Programming, Highway Safety, Weights and Standards, Traffic Services, and Traffic Engineering) involved in transportation planning, operations, and maintenance. Some of the typical responsibilities include incident detection and response, evacuation planning and management, transportation data collection, management, and distribution for the local region as well as for the entire state.
Local Emergency Medical Providers	This includes local hospitals and emergency medical service providers (i.e., ambulance, air-evacuation, etc) that are components of emergency management.

Stakeholder Name	Stakeholder Description
Local Public Safety Agencies	These are the groups responsible for operating local police, fire, and EMS offices and vehicles throughout region. This stakeholder group includes all the regional agencies that are involved in emergency, fire, police, and other public safety/emergency response activities. The list of agencies included in this stakeholder group is as follows: Calcasieu Parish Sheriff's office, City of Lake Charles Police Department, City of Westlake Police Department, Town of Vinton Police Department, Town of Iowa Police Department, Calcasieu Parish Office of Homeland Security & Emergency Preparedness.
Louisiana State Police	Louisiana State Police agency is responsible for operating Louisiana State Police Centers. This includes Computer Aided Dispatch database, which collects incident/emergency detection, dispatch, response, and status information related to the Louisiana State Police officers/equipment. They are also responsible for Louisiana State Police vehicles.
Media	This stakeholder group includes local TV/Radio Channels and print media that are responsible for receiving and distributing transportation information like traffic conditions, incidents, and road weather conditions.
Public	Members of the general public own and operate various devices/systems to access ITS information including PDAs, cell phones, and personal computers.
Tourism and Traveler Information Service Providers	This includes various tourism agencies, chambers of commerce, hotel associations, motorist services, and Map search.

6 ITS Inventory

An inventory of existing and planned transportation systems is the basis for the Lake Charles Regional ITS Architecture. The transportation system inventory was developed based on input from stakeholders throughout the region. The inventory includes a list of ITS elements and the associated stakeholder responsible for system operation.

Table 3 describes every surface transportation inventory element for the region. A transportation element can be a center, vehicle, traveler, or field equipment. Each transportation element listed has one or more associated stakeholders, see **Section 5**. In order to reduce the complexity of the architecture, some transportation elements with similar functionality have been grouped together. Each transportation inventory element is mapped to at least one National ITS Architecture entity.

Table 3: ITS Inventory

Element Name	Element Description	Stakeholder	Element Status
Calcasieu Parish 911	This element represents the parish emergency response operations including City fire, police, 911, and any other emergency response operators. This element is responsible for the emergency response operations and management within the parish jurisdiction.	Calcasieu Parish Police Jury	Existing
Calcasieu Parish OHSEP	The Office of Homeland Security And Emergency Preparedness (OHSEP) leads, coordinates, and supports the emergency management system in order to protect lives and prevent the loss of property from all hazards. The parish OHSEP coordinates directly with the Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP) for planning and managing emergency response to major disasters on a state-wide basis.	Calcasieu Parish Police Jury	Existing
Calcasieu Parish Sheriff's Motorist Assistance Patrol (MAP)	This element represents the motorist assistance patrol vehicles jointly funded, operated, and maintained by the DOTD, Calcasieu Parish Police Jury and Calcasieu Parish Sheriff's office.	Local Public Safety Agencies	Existing
Calcasieu Parish Sheriff's Office	This element represents the Calcasieu Parish Sheriff's Office dispatch center.	Local Public Safety Agencies	Existing
City of Lake Charles Engineering	This element represents traffic operations or traffic engineering within the city that is responsible for traffic management activities within the jurisdiction. The typical activities include traffic monitoring, traffic data collection, operation of traffic signal operations, and other traffic management related activities.	City of Lake Charles	Existing
City of Lake Charles Police Dept	This element represents City of Lake Charles Police Department dispatch center.	City of Lake Charles	Existing
City of Lake Charles Traffic Signal System	This element represents traffic signals operated and maintained by the City of Lake Charles.	City of Lake Charles	Existing

Element Name	Element Description	Stakeholder	Element Status
City of Sulphur Police Dept	This element represents the City of Sulphur Police dispatch center.	City of Sulphur	Existing
DOTD Adjacent District Office	Louisiana Department of Transportation and Development includes 8 other districts that are responsible for coordination of statewide ITSs. These also include 2 adjacent districts which are involved in direct corridor level coordination with the Lake Charles region, i.e. Corridor level coordination with Lafayette district (District 03) for traffic management operations and evacuation planning along I-10 and Alexandria district (District 08) for evacuation planning along US 165.	LADOTD	Existing
DOTD District 07 Traffic Operations	This element represents traffic operations or traffic engineering within the district office that is responsible for traffic management activities within the district jurisdiction. The typical activities include traffic monitoring, traffic data collection, operation of traffic signal operations, and other traffic management related activities. This also includes communicating with Traffic Management Centers (TMCs) and other departments like maintenance for roadway maintenance activities.	LADOTD	Existing
DOTD District 07 Traffic Signal System	This element represents traffic signals operated and maintained by the District.	LADOTD	Existing
DOTD ITS Field Equipment	This element includes the equipment distributed on and along the roadway that monitors and controls traffic and monitors and manages the roadway itself. Equipment includes traffic signals, traffic detectors, environmental sensors, highway advisory radios, dynamic message signs, closed circuit television (CCTV) cameras and video image processing systems, and grade crossing warning systems.	LADOTD	Existing
DOTD ITS Section	This element represents ITS Section (Section 56) under the LADOTD. The ITS section is responsible for the state-wide operations center located in DOTD headquarters. Also, the ITS section is responsible for the management of information systems for transportation, state-wide ITS elements operations, and maintenance. The ITS section is also responsible for maintenance of all ITS equipment in the state.	LADOTD	Existing
DOTD Social Media	This includes Facebook and Twitter.	LADOTD	Existing

Element Name	Element Description	Stakeholder	Element Status
DOTD Statewide TMC	This element represents the traffic operations center that is responsible for traffic management activities throughout the state. The typical activities include traffic monitoring, traffic data collection, operation of ITS elements (CCTV, DMS, etc.), detection and verification of incidents, traffic signal monitoring, and other traffic management related activities. This also includes communicating with other agencies, districts, TMCs, and DOTD departments such as maintenance for roadway maintenance activities.	LADOTD	Existing
IMCAL Database	This element represents IMCAL data service which directly or indirectly collects and provides transportation system data.	Imperial Calcasieu Regional Planning and Development Commission	Planned
Lake Charles TMC	This element represents the traffic operations center within the region that is responsible for local traffic management activities. The typical activities include traffic monitoring, traffic data collection, operation of ITS elements (CCTV, DMS, etc.), detection and verification of incidents, traffic signal monitoring, and other traffic management related activities. This also includes communicating with other agencies, districts, TMCs, and DOTD departments like maintenance for roadway maintenance activities.	LADOTD	Planned
Local Emergency Medical	This includes local hospitals as well as local emergency medical service providers (e.g., emergency rescue, ambulance, etc).	Local Emergency Medical Providers	Existing
Local Emergency Operations Centers	This element represents emergency dispatch centers operated by local agencies including 911, emergency operation center and fire response dispatch center.	Local Public Safety Agencies	Existing
Local Print and Broadcast Channels	This includes local newspapers as well as radio and television broadcast providing transportation information.	Media	Existing
Louisiana 511/ Website	This element provides traveler information service provided by the LADOTD in conjunction with private partner.	LADOTD	Existing
Louisiana State Police (LSP) Troop D	This element represents the Louisiana State Police department; the Lake Charles metropolitan area is covered by Troop D.	Louisiana State Police	Existing
Other Local Public Safety Agencies	These are the local police/sheriff departments and 911 centers for the agencies that do not have a primary role in Traffic incident management and enforcement on major highways in the area.	Local Public Safety Agencies	Existing

Element Name	Element Description	Stakeholder	Element Status
Tourism and Travel Service Information Sources	Private Tourism and Traveler Information Websites, local hotel associations, visitor centers, etc.	Tourism and Traveler Information Service Providers	Existing
Traveler	This element represents the motorist or user of the regional transportation system.	Public	Existing

6.1 Existing Regional ITSs and Operations

Currently, Lake Charles does not have a regional architecture but has ITS elements that impact the area. These elements have been compiled in **Table 4**. The existing ITS equipment table serves as examples of low level systems, whereas the ITS Inventory (**Table 3**), is a much higher, broader level of planning. The following sections further describe the existing equipment.

Table 4: Existing ITS

ITS Equipment	Description	Stakeholder	Element Name*
Closed Circuit Television (CCTV) Cameras	8 Cameras at 4 sites <ul style="list-style-type: none"> • 2 PTZ - I-10 and Route 171 • 1 PTZ- I-210 and Route 90 • 1 PTZ – East junction of I-10 and 210 • 4 (1 PTZ, 3 Fixed)- I-10 and Route 165 (town of Iowa) • All sites use wireless communications 	LADOTD	DOTD ITS Field Equipment
Dynamic Message Sign (DMS)	1 site <ul style="list-style-type: none"> • Sign is inoperable and replacement planned) I-10/I-210 East bound 	LADOTD	DOTD ITS Field Equipment
Portable Changeable Message Signs (PCMS)	9 PCMSs <ul style="list-style-type: none"> • Wireless communications used for remote control 	LADOTD	DOTD ITS Field Equipment
Motorist Assistance Patrol (MAP) Vehicles and Equipment	2 vehicles <ul style="list-style-type: none"> • 6:30am to 6:30pm 7 days/week • Limit travel to 325 miles per day • Limits: I-10 and I-210 freeway, from route LA 108 to LA 397 • Cellular phones used for communications 	LADOTD and Calcasieu Parish Sheriff's Department	Calcasieu Parish Sheriff's MAP
Louisiana 511/ Website	Construction, major incidents, freeway speed I-10 and I-210 within the MPO	LADOTD ITS, District 07	Louisiana 511/ Website

ITS Equipment	Description	Stakeholder	Element Name*
DOTD District 07 Traffic Signal System	210 traffic signals <ul style="list-style-type: none"> • 21 closed loop systems with D07 and 185 signals • 14 closed loop systems within the architecture area • Hardwire interconnect with dial up modems for remote access 	LADOTD District 07	DOTD District 07 Traffic Signal System
Calcasieu Parish Traffic Signal System	2 traffic signals <ul style="list-style-type: none"> • No closed loop systems 	Calcasieu Parish Police Jury	
City of Lake Charles Traffic Signal System	66 traffic signals <ul style="list-style-type: none"> • 1 closed loop system; joint with DOTD • Hardwire interconnect with dial up modems for remote access 	City of Lake Charles	City of Lake Charles Traffic Signal System
City of Sulphur Traffic Signal System	3 traffic signals <ul style="list-style-type: none"> • No closed loop systems 	City of Sulphur	
* The existing ITS equipment are instances of the ITS Inventory Elements indicated, see Table 3.			

6.1.1 Video Surveillance

The closed circuit television (CCTV) cameras are controlled and primarily monitored by the Statewide Transportation Management Center (TMC) in Baton Rouge. Monitoring of these cameras by District 07 (Lake Charles) is done through the network IP address. District 07 does not have operating control of the cameras in their District. To pan, tilt, or zoom any of the cameras, District 07 requests the Statewide TMC to perform this operation.

6.1.2 Message Signs

DOTD District 07 currently has one dynamic message sign (DMS) located eastbound at the I-10 and I-210 interchange. It was installed in the early 1980s for the construction of I-210. This DMS (Circa 1980- 1984) is currently inoperable and is planned to be replaced.

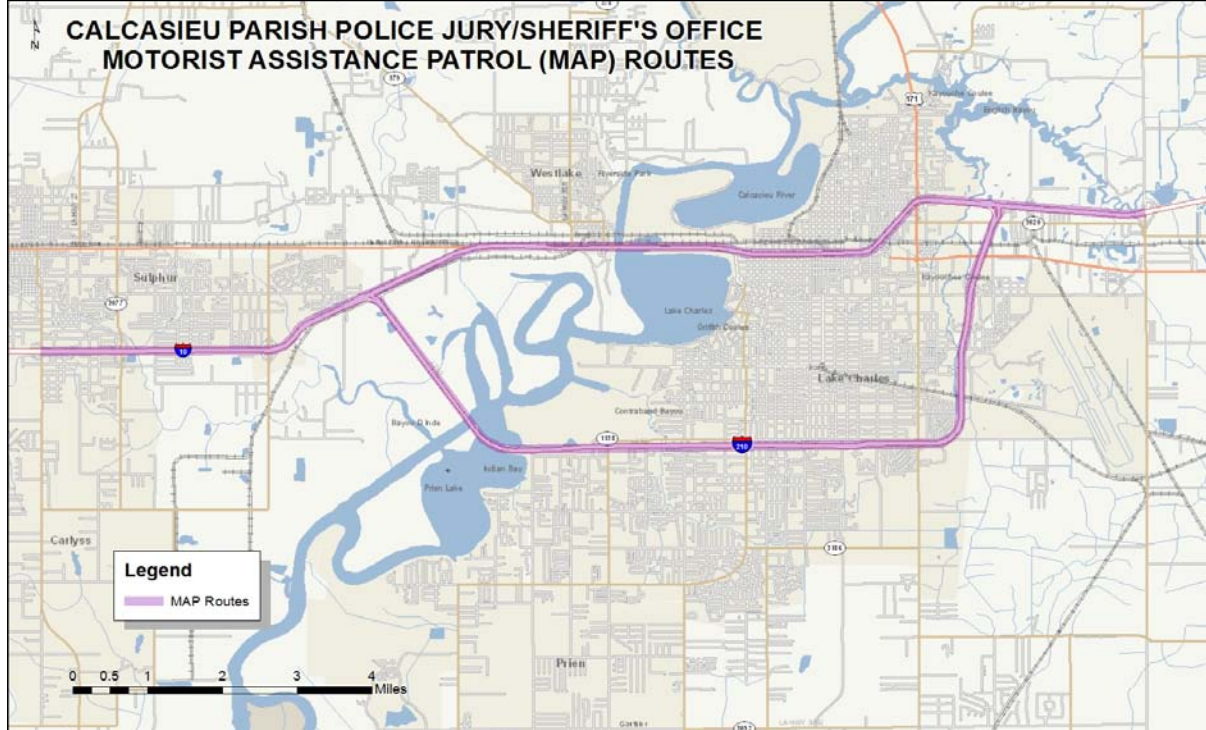
DOTD District 07 has nine portable changeable messages signs (PCMS) that are used primarily for special events, incident management, and evacuation purposes. These PCMS have remote control capabilities which are controlled by the district staff.

6.1.3 Motorist Assistance Patrol (MAP)

The Lake Charles area has a Motorist Assistance Patrol program operating in the region. The program is jointly funded by DOTD, Calcasieu Parish Police Jury, and Calcasieu Parish Sheriff's Office. The general services currently provided by the MAP program are listed below. The limits of MAP have been illustrated in Figure 2.

- Change tires
- Inflate tires
- Provide fuel
- Perform first aid
- Clear travel lanes
- Traffic control
- Cell phone use
- Debris removal

Figure 2: MAP Limits of Patrol



6.1.4 Traveler Information System

The Louisiana 511/ Website is a traveler information system which allows drivers to actively engage in smart travel by choosing less congested routes and avoiding incident areas. 511 can be reached by most cell phones and landlines or accessed on the internet at www.511LA.org. The information broadcasted/displayed for Lake Charles is limited to construction information, lane closures, speed information, and reported incidents on state routes. All information for entry to 511 is provided to the Statewide TMC. The lane closure and construction information is communicated from DOTD District 07 via email. Incidents that occur on the state routes are communicated from the State Police. The speed information for the Lake Charles area is extracted from Google speed information.

6.1.5 Closed Loop Signal System

The majority of the traffic signals within the architecture boundary are owned, operated, and maintained by the DOTD. District 07 traffic engineering staff operates a total of 210 intersections within the District, including 21 closed loop systems. Within the architecture area, District 07 operates and maintains 185 signals, which includes 14 closed loop systems. 70 traffic signals within the area are partially maintained by the City of Lake Charles through a Limited Maintenance Agreement.

Traffic signals controlled by District 07 that are outside of the architecture boundary include the following:

- Kinder – 2 signals – 1 closed loop system
- Oakdale – 4 signals – 1 closed loop system
- DeRidder – 10 signals – 1 closed loop system

-
- Jennings – 9 signals – 4 closed loop system

The City of Lake Charles owns and operates 66 signalized intersections. Of these intersections, only one corridor, Prien Lake Rd., is part of a closed loop system that is operated by District 07.

Calcasieu Parish Police Jury owns two isolated signalized intersections, but has an agreement with the City of Lake Charles to operate and maintain them.

The City of Sulphur owns three isolated signalized intersection and uses a consultant to operate and maintain them.

6.2 Transportation Issues

6.2.1 High Incidents

In the City of Sulphur, the City Police Department has jurisdiction over a section of I-10 that includes three (3) intersections between Ruth St. and the I-10/I-210 interchange. These are Ruth/I-10, LA 27/I-10, and LA 108/I-10. The Police Department identified the Exit 23 (LA 108) on-ramp as a high accident rate location due to the short entrance distance. The Calcasieu Parish Sheriff's office identified mile-marker 30 as a "hot spot" for truck roll-overs.

6.2.2 High Growth, Congestion, and Needed Signal Coordination

There is high congestion, due to an existing casino, at the I-210 and Exit 4 Nelson Rd. There is an additional hotel and casino planned for construction in the same area within the next 5 years. This will create additional congestion in the same location. This is a major concern for these routes.

Major congestion exists during peak hours on the following routes:

- Ryan corridor
- LA 384 (Country Club Rd)
- Prien Lake Rd.
- East School St
- McNeese St.

Heavy congestion exists at the following key locations:

- I-210 south section of loop between Nelson to LA 14
- Nelson Rd, Lake St, Ryan St, Louisiana Ave/Enterprise Blvd and LA 14

Lake Charles signal upgrade and communications are needed for the following routes:

- Lake Street
- 12th St. (LA 14 to Ryan)
- Kirkman St
- Common St
- Enterprise Blvd
- US 90
- Broad St

6.2.3 Bridges

The I-10 Bridge which crosses Lake Charles and the Calcasieu River is known for its high rear end collision crash rates due to stopping sight distance restrictions and the high volume of trucks.

The I-210 Bridge crossing Lake Charles is subject to high vehicular volumes as I-210 is the primary alternate route for I-10 traffic.

The I-10 Bridge at the Texas/Louisiana state line carries high traffic volumes and there is no immediate alternate route that can handle the high volume of interstate traffic. Remote surveillance of the bridge is desired, however, this need can be better addressed as part of the statewide architecture and not part of the Lake Charles Regional ITS Architecture.

LA 378 is an alternate route for US 171 and is avoided due to its movable bridge. LA 378 is a four-lane highway that necks down to a two-lane highway for a 3.5 mile segment that contains the movable bridge and two “T” intersections and causes congestion issues along this route.

6.2.4 Evacuation Routes

Lake Charles contains several evacuation routes as the region is susceptible to hurricanes. The major routes include: I-10, US 171, US 165, LA 14, LA 27 and LA 82. In emergency conditions, these routes carry major north bound traffic.

6.2.5 Rail Crossings

There is a major industry development planned for Lake Charles, over the next 5 years, which will increase rail traffic from the Port of Lake Charles. This would greatly impact Ryan Street, Enterprise Blvd., and the other major corridors that are already heavily congested.

7 ITS Services

ITS services describe what can be done to improve the efficiency, safety, and convenience of the regional transportation system through better information, advanced systems, and new technologies. Some services are specific to one primary stakeholder while others require broad stakeholder participation. This section describes the ITS services that meet the transportation needs in the region. For the full description of the Market Package, please see the [National ITS Architecture](#).

Table 5: ITS Services

Market Package	Market Package Name	Description	Market Package Status	Included Elements
AD1	ITS Data Mart	This market package provides a focused archive that houses data collected and owned by a single agency, district, private sector provider, research institution, or other organization.	Planned	DOTD Statewide TMC
			Planned	IMCAL Database
			Planned	Lake Charles TMC
AD2	ITS Data Warehouse	This market package includes all the data collection and management capabilities, provided by the ITS Data Mart, and adds the functionality and interface definitions that allow collection of data from multiple agencies and data sources spanning across modal and jurisdictional boundaries.	Planned	DOTD Statewide TMC
			Planned	IMCAL Database
			Planned	Lake Charles TMC
ATIS01	Broadcast Traveler Information	This market package collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, and air quality and weather information and broadcasts the information to travelers using technologies such as FM subcarrier, satellite radio, cellular data broadcasts, and Internet web casts.	Existing	DOTD Social Media
			Existing	Local Print and Broadcast Channels
			Existing	Louisiana 511/ Website
			Planned	Tourism and Travel Service Information Sources
ATIS06	Transportation Operations Data Sharing	This market package collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, and air quality and weather information and broadcasts the information to travelers using technologies such as FM subcarrier, satellite radio, cellular data broadcasts, and Internet web casts.	Planned	City of Lake Charles Engineering
			Planned	DOTD Adjacent District Office
			Planned	DOTD District 07 Traffic Operations
			Planned	DOTD ITS Section
			Planned	DOTD Statewide TMC
			Planned	Lake Charles TMC
ATMS01	Network Surveillance	This market package includes traffic detectors, other surveillance equipment, the supporting field equipment, and fixed-point to fixed-point communications to transmit the collected data back to the Traffic Management Subsystem.	Planned	Calcasieu Parish 911
			Existing	DOTD District 07 Traffic Operations
			Existing	DOTD ITS Field Equipment

Market Package	Market Package Name	Description	Market Package Status	Included Elements
		The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Subsystem). The data generated by this market package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Information Service Provider Subsystem.	Existing	DOTD ITS Section
			Existing	DOTD Social Media
			Existing	DOTD Statewide TMC
			Planned	Lake Charles TMC
			Existing	Louisiana 511/ Website
ATMS02	Traffic Probe Surveillance	This market package provides an alternative approach for surveillance of the roadway network. Two general implementation paths are supported by this market package: wide-area wireless communications between the vehicle and center are used to communicate vehicle operational information and status directly to the center, and dedicated short range communications between passing vehicles and the roadside are used to provide equivalent information to the center.	Planned	DOTD ITS Field Equipment
			Planned	DOTD ITS Section
			Planned	DOTD Statewide TMC
			Planned	Lake Charles TMC
ATMS03	Surface Street Control	This market package provides the central control and monitoring equipment, communication links, and the signal control equipment that support local surface street control and/or arterial traffic management. A range of traffic signal control systems are represented by this market package ranging from fixed-schedule control systems to full traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests. This market package is generally an intra-jurisdictional package that does not rely on real-time communications between separate control systems to achieve area-wide traffic signal coordination. Systems that achieve coordination across jurisdictions by using a common time base or other strategies that do not require real time coordination would be represented by this package. This market package is consistent with typical urban traffic signal control systems.	Existing	City of Lake Charles Engineering
			Existing	City of Lake Charles Traffic Signal System
			Existing	DOTD District 07 Traffic Operations

Market Package	Market Package Name	Description	Market Package Status	Included Elements
ATMS06	Traffic Information Dissemination	This market package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio.	Planned	DOTD ITS Field Equipment
			Planned	DOTD Statewide TMC
			Planned	Lake Charles TMC
ATMS07	Regional Traffic Management	This market package provides for the sharing of traffic information and control among traffic management centers to support regional traffic management strategies. Regional traffic management strategies that are supported include coordinated signal control in a metropolitan area and coordination between freeway operations and arterial signal control within a corridor. This market package advances the Surface Street Control and Freeway Control Market Packages by adding the communications links and integrated control strategies that enable integrated inter-jurisdictional traffic management.	Planned	DOTD Statewide TMC
			Planned	Lake Charles TMC
ATMS08	Traffic Incident Management System	This market package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The market package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management, and emergency management centers, as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this market package to detect and verify incidents and implement an appropriate response. This market package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The	Planned	Calcasieu Parish 911
			Planned	Calcasieu Parish OHSEP
			Planned	Calcasieu Parish Sheriff's Office
			Planned	City of Lake Charles Police Dept
			Planned	City of Sulphur Police Dept
			Planned	DOTD District 07 Traffic Operations
			Planned	DOTD ITS Field Equipment
			Planned	DOTD ITS Section
			Planned	DOTD Statewide TMC
			Planned	Lake Charles TMC
			Planned	LSP Troop D

Market Package	Market Package Name	Description	Market Package Status	Included Elements
		response may include traffic control strategy modifications or resource coordination between center subsystems. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination market package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information market packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a Computer Aided Dispatch (CAD) system or through other communication with emergency field personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel.	Planned	Other Local Public Safety Agencies
ATMS09	Traffic Decision Support and Demand Management	This market package recommends courses of action to traffic operations personnel based on an assessment of current and forecast road network performance. This market package also collects air quality, parking availability, transit usage, and vehicle occupancy data to support Travel Demand Management (TDM), where applicable.	Planned	Calcasieu Parish Sheriff's MAP
			Planned	DOTD Statewide TMC
			Planned	Lake Charles TMC
ATMS19	Speed Monitoring	This market package monitors the speeds of vehicles traveling through a roadway system. If the speed is determined to be excessive, roadside equipment can suggest a safe driving speed. Environmental conditions may be monitored and factored into the safe speed advisories that are provided to the motorist. This service can also support notifications to an enforcement agency to enforce the speed limit on a roadway system.	Planned	DOTD District 07 Traffic Operations
			Planned	DOTD ITS Field Equipment
			Planned	DOTD ITS Section
			Planned	DOTD Statewide TMC
			Planned	Lake Charles TMC
ATMS20	Drawbridge Management	This market package supports systems that manage drawbridges at rivers and canals and other multimodal crossings (other than railroad grade crossings which are specifically covered by other market packages).	Planned	DOTD ITS Field Equipment
			Planned	DOTD ITS Section
			Planned	DOTD Statewide TMC
			Planned	Lake Charles TMC

Market Package	Market Package Name	Description	Market Package Status	Included Elements
EM01	Emergency Call-Taking and Dispatch	This market package provides basic public safety call-taking and dispatch services. It includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Subsystems supports emergency notification between agencies. Wide area wireless communications between the Emergency Management Subsystem and an Emergency Vehicle supports dispatch and provision of information to responding personnel.	Existing	Calcasieu Parish 911
EM04	Roadway Service Patrols	This market package supports roadway service patrol vehicles that monitor roads that aid motorists, offering rapid response to minor incidents (flat tire, accidents, out of gas) to minimize disruption to the traffic stream. If problems are detected, the roadway service patrol vehicles will provide assistance to the motorist (e.g., push a vehicle to the shoulder or median). The market package monitors service patrol vehicle locations and supports vehicle dispatch to identified incident locations. Incident information collected by the service patrol is shared with traffic, maintenance and construction, and traveler information systems.	Existing	Calcasieu Parish 911
			Existing	Calcasieu Parish Sheriff's MAP
			Existing	Calcasieu Parish Sheriff's Office
			Existing	City of Lake Charles Police Dept
			Existing	City of Sulphur Police Dept
			Existing	DOTD Statewide TMC
			Planned	Lake Charles TMC
			Existing	Local Emergency Operations Centers
			Existing	LSP Troop D
EM06	Wide-Area Alert	This market package uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property.	Planned	Calcasieu Parish 911
			Planned	Calcasieu Parish OHSEP
			Planned	DOTD Statewide TMC
			Planned	Lake Charles TMC
EM08	Disaster Response and Recovery	This market package enhances the ability of the surface transportation system to respond to, and recover from, disasters. The market package supports coordination of emergency response plans, including general plans developed before a disaster, as well as specific tactical plans with short time horizon that are	Planned	Calcasieu Parish OHSEP
			Planned	DOTD ITS Section
			Planned	DOTD Statewide TMC
			Planned	Local Emergency Medical

Market Package	Market Package Name	Description	Market Package Status	Included Elements
		developed as part of a disaster response.	Planned	LSP Troop D
EM09	Evacuation and Reentry Management	This market package supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. This market package supports coordination of evacuation plans among the federal, state, and local transportation, emergency, and law enforcement agencies that may be involved in a large-scale evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan.	Planned	Calcasieu Parish OHSEP
			Planned	DOTD District 07 Traffic Operations
			Planned	DOTD ITS Section
			Planned	DOTD Statewide TMC
			Planned	Lake Charles TMC
			Planned	Local Emergency Medical
			Planned	Local Emergency Operations Centers
			Planned	LSP Troop D
EM10	Disaster Traveler Information	This market package uses ITS to provide disaster-related traveler information to the general public, including evacuation and reentry information and other information concerning the operation of the transportation system during a disaster.	Planned	Calcasieu Parish OHSEP
			Planned	Local Emergency Operations Centers
MC07	Roadway Maintenance and Construction	This market package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Maintenance services would include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, CCTV, etc.).	Existing	DOTD Adjacent District Office
			Existing	DOTD District 07 Traffic Operations
			Existing	DOTD ITS Section
			Existing	DOTD Statewide TMC
			Planned	Lake Charles TMC
MC08	Work Zone Management	This market package manages work zones, controlling traffic in areas of the roadway where maintenance, construction, and utility work activities are underway. Traffic conditions are monitored using CCTV cameras and controlled using dynamic message signs (DMS), Highway Advisory Radio (HAR), gates, and barriers. Work zone speeds and delays are provided to the motorist prior to the work zones.	Existing	DOTD District 07 Traffic Operations
			Existing	DOTD ITS Field Equipment
			Existing	DOTD ITS Section
			Existing	DOTD Statewide TMC
			Planned	Lake Charles TMC
MC12	Infrastructure Monitoring	This market package monitors the condition of pavement, bridges, tunnels, associated	Planned	City of Lake Charles Engineering

Market Package	Market Package Name	Description	Market Package Status	Included Elements
		hardware, and other transportation-related infrastructure (e.g., culverts) using both fixed and vehicle-based infrastructure monitoring sensors. Fixed sensors monitor vibration, stress, temperature, continuity, and other parameters while mobile sensors and data logging devices collect information on current infrastructure condition. This market package also monitors vehicle probes for vertical acceleration data and other probe data that may be used to determine current pavement condition.	Planned	DOTD District 07 Traffic Operations
			Planned	DOTD ITS Section

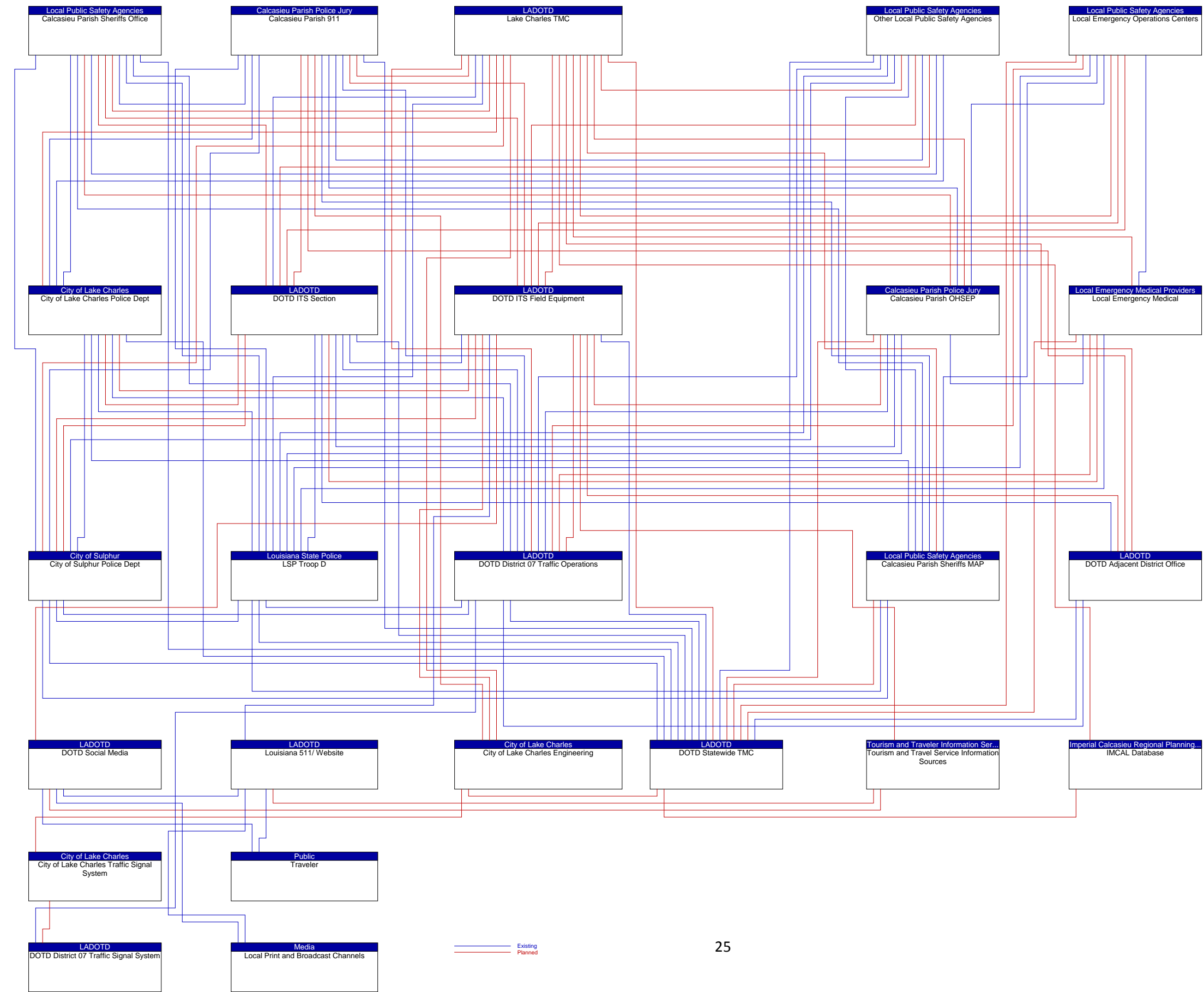
8 Interfaces between Systems

The interfaces of the transportation systems in Lake Charles Regional ITS Architecture are based on the National ITS Architecture and tailored to reflect the plan for that region. Architecture diagrams display the transportation systems in the Lake Charles Regional ITS Architecture and, more importantly, how these systems are and will be connected with one another so that information can be exchanged and transportation services can be coordinated. Stakeholders may use these diagrams to identify integration opportunities. Each system in the region is represented with two types of diagrams: an overall interconnect diagram and element specific architecture flow context diagrams, both described below.

The interconnect diagram shows the connections between systems (i.e., Elements), see **Figure 3**. Interconnects are represented as single lines and indicate information sharing without specifying the type of information being shared or the direction of the information movement, shown as planned or existing. An architecture flow context diagram shows a particular system and all other systems with which it is interconnected, the information being shared (i.e. architecture flows), and the direction of the flow. Descriptions of the architecture flows are included in **Appendix A**. The architecture flow context diagrams have been included within this document as part of **Appendix B**.

Information about the interfaces of the systems in the region is contained in the Turbo Architecture™ database. Turbo Architecture™ can be used to create tailored interconnect and architecture flow diagrams for any system in the database.

Figure 3: Interconnect Diagram



9 Operational Concept

The Operational Concept lists the Roles and Responsibilities (RR) that each participating agency must take on to provide the ITS services included in the ITS Architecture. Changing needs may arise that will require an agreement to be formed between all affected parties that defines new or additional roles. Defining the roles and responsibilities of the participating stakeholders in the region and the willingness of agencies to accept their roles and responsibilities is an important step in realizing the common goal of an interoperable ITS throughout the region.

Table 6: Operational Concept

RR Area Name	Stakeholder	RR Description	RR Status
Archived Data Systems for Lake Charles Regional ITS Architecture	City of Lake Charles	Crash data collection	Existing
	City of Lake Charles	Incident response	Existing
	City of Lake Charles	Traffic data collection	Planned
	City of Sulphur	Incident response	Existing
	City of Sulphur	Crash data collection	Existing
	Imperial Calcasieu Regional Planning and Development Commission	Transportation planning	Existing
	Imperial Calcasieu Regional Planning and Development Commission	Archive data management	Planned
	LADOTD	Traffic operations	Existing
	LADOTD	Traffic data collection	Existing
	Local Public Safety Agencies	Crash data collection	Existing
	Louisiana State Police	Crash data	Existing
Emergency Management for Lake Charles Regional ITS Architecture	Calcasieu Parish Police Jury	Resource and supply service provider	Existing
	City of Lake Charles	Emergency response	Existing
	City of Sulphur	Emergency response	Existing
	LADOTD	Resources for emergency	Existing
	LADOTD	Motorist information systems	Existing
	LADOTD	Traffic Control	Existing
	LADOTD	Infrastructure monitoring	Planned
	LADOTD	Event monitoring	Planned
	Local Emergency Medical Providers	Medical response	Existing
	Local Public Safety Agencies	Traffic control	Existing
	Louisiana State Police	Traffic control	Existing
	Louisiana State Police	Emergency response	Planned
Freeway Management for Lake Charles Regional ITS Architecture	City of Lake Charles	Incident response	Existing
	City of Lake Charles	Incident management	Existing
	City of Lake Charles	Speed enforcement	Existing
	City of Lake Charles	Traffic control	Existing

RR Area Name	Stakeholder	RR Description	RR Status
	City of Sulphur	Incident response	Existing
	City of Sulphur	Incident management	Existing
	City of Sulphur	Speed enforcement	Existing
	City of Sulphur	Traffic control	Existing
	Imperial Calcasieu Regional Planning and Development Commission	Transportation planning	Existing
	LADOTD	Traffic operations	Existing
	LADOTD	Traffic data collection	Existing
	LADOTD	Traffic Control	Existing
	LADOTD	Infrastructure monitoring	Planned
	LADOTD	Event monitoring	Planned
	LADOTD	Motorist information systems	Planned
	Local Public Safety Agencies	Traffic control	Existing
	Local Public Safety Agencies	Motorists assistance	Existing
	Louisiana State Police	Incident response	Existing
	Louisiana State Police	Speed enforcement	Existing
	Media	Motorist information	Existing
	Tourism and Traveler Information Service Providers	Motorist information	Existing
Incident Management for Lake Charles Regional ITS Architecture	City of Lake Charles	Incident response	Existing
	City of Lake Charles	Incident management	Existing
	City of Lake Charles	Speed enforcement	Existing
	City of Lake Charles	Traffic control	Existing
	City of Sulphur	Incident response	Existing
	City of Sulphur	Incident management	Existing
	City of Sulphur	Speed enforcement	Existing
	City of Sulphur	Traffic control	Existing
	Imperial Calcasieu Regional Planning and Development Commission	Transportation planning	Existing
	LADOTD	Traffic operations	Existing
	LADOTD	Traffic data collection	Existing
	LADOTD	Traffic Control	Existing
	LADOTD	Infrastructure monitoring	Planned
	LADOTD	Event monitoring	Planned
	LADOTD	Motorist information systems	Planned
	Local Emergency Medical Providers	Medical response	Existing
	Local Public Safety Agencies	Motorists assistance	Existing

RR Area Name	Stakeholder	RR Description	RR Status
	Local Public Safety Agencies	Traffic control	Planned
	Louisiana State Police	Incident response	Existing
	Louisiana State Police	Speed enforcement	Existing
	Louisiana State Police	Emergency response	Existing
	Media	Motorist information	Existing
	Tourism and Traveler Information Service Providers	Motorist information	Existing
Maintenance and Construction for Lake Charles Regional ITS Architecture	Calcasieu Parish Police Jury	Surface street maintenance and construction provider	Existing
	City of Lake Charles	Traffic signal system maintenance and construction	Existing
	City of Lake Charles	Surface street maintenance and construction	Existing
	City of Sulphur	Surface street maintenance and construction	Existing
	Imperial Calcasieu Regional Planning and Development Commission	Archive data management	Planned
	LADOTD	Traffic data collection	Existing
	LADOTD	Traffic signal system maintenance and construction	Existing
	LADOTD	Roadway maintenance and construction	Existing
	LADOTD	Infrastructure monitoring	Planned
	Media	Motorist information	Existing
	Tourism and Traveler Information Service Providers	Motorist information	Existing
Surface Street Management for Lake Charles Regional ITS Architecture	City of Lake Charles	Traffic signal operations	Existing
	City of Lake Charles	Traffic data collection	Existing
	Imperial Calcasieu Regional Planning and Development Commission	Transportation planning	Existing
	LADOTD	Traffic data collection	Existing
	LADOTD	Traffic Control	Existing
	LADOTD	Traffic signal operations	Existing
Traveler Information for Lake Charles Regional ITS Architecture	LADOTD	Motorist information systems	Planned
	Media	Motorist information	Existing
	Public	End user of traveler information	Existing

RR Area Name	Stakeholder	RR Description	RR Status
	Tourism and Traveler Information Service Providers	Motorist information	Existing

9.1 ITS Deployment Plan –Sequence of Planned Projects

This section describes the projects that came from the architecture workshop and was used to develop the architecture for the region. These projects address the needs described in the previous section. **Figure 4** shows the projects based on their respective corridors and are further detailed in **Table 7**. Also, **Appendix C** shows the specific devices and proposed ITS equipment sites; traffic signal sites and vehicle detection sites are not included.

Figure 4: ITS Deployment Plan

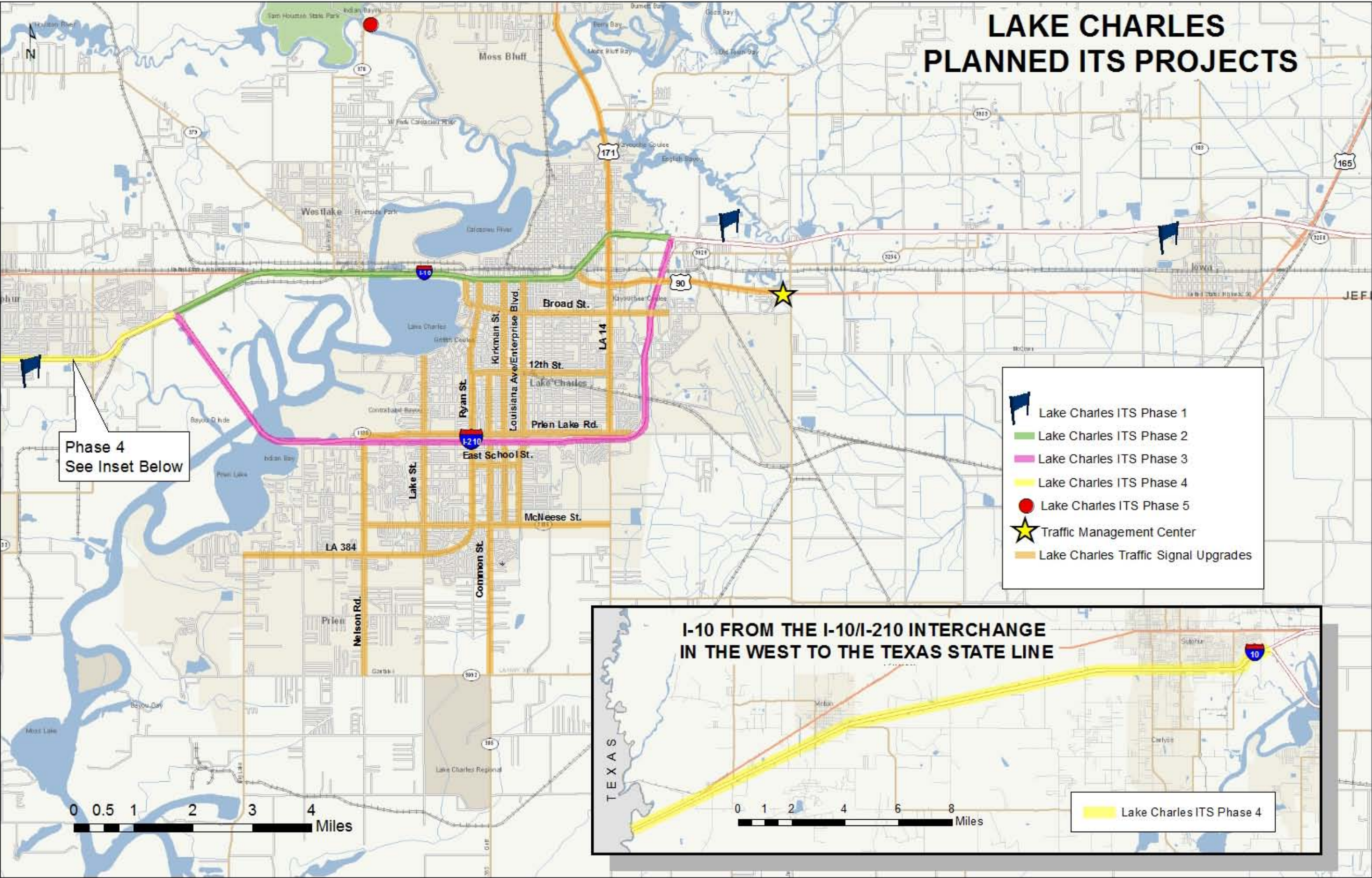


Table 7: Project Sequence

Name	Description	Service Scope	Geo Scope	Time Frame	Market Packages	Design Cost	Capital Cost	O&M	Total Cost
Motorist Assistance Patrol	The Motorist Assistance Patrol (MAP) currently is being provided jointly by DOTD and the Calcasieu Parish Sheriff's Office. This project is the annual continuation of the ongoing MAP	Lake Charles has a Motorist Assistance Patrol operating in the region. The following are the general services currently provided by the MAP -Change tires -Inflate tires -Provide fuel -Perform first aid -Clear travel lanes -Traffic control	I-10 and I-210 through Lake Charles, Sulphur and Westlake. Limits may be adjusted to accommodate needs.	All 5 Year	EM04		\$ 240,000.00 - \$ 385,000.00	\$ 240,000.00 - \$ 385,000.00	\$ 1,200,000.00 - \$ 1,925,000.00
Lake Charles Dynamic Message Signs (Lake Charles ITS Phase 1)	Three Dynamic Message Signs (DMSs) will be installed adjacent to or at the original sign locations originally installed in the early 1980s. Two of the sites are located such that if an incident were to happen on Calcasieu River Bridge, motorists can be guided to the I-210 loop	Deployment includes DMS, communications, and integration for roadside motorist advisory.	I-10 Westbound - Between LA 397, Ward Line Rd. and I-10/I-210 Interchange (East) I-10 Eastbound - Prior to LA 383, Thomson Ave. I-10 Eastbound - Prior to I-10/I-210 Interchange (West)	1 Year	ATIS01 MC08 ATMS04 EM06 ATMS06 EM10 ATMS07 MC07 ATMS08 MC08 EM08 MC12 EM09	\$ 11,000.00	\$ 1,000,000.00 - \$ 1,200,000.00	\$ 220,000.00 - \$ 410,000.00	\$ 1,220,000.00 - \$ 1,621,000.00
Lake Charles ITS Phase 2	Project to deploy ITS field equipment for the I-10 corridor through Lake Charles to support Incident Management	Project includes CCTV surveillance, vehicle detection, a motorist advisory system for the I-10 Bridge crossing Lake Charles/Calcasieu River, communications, and integration. Field equipment to be operated by the LADOTD Statewide TMC/Lake Charles TMC.	I-10 from the I-10/I-210 interchange in the East to the I-10/I-210 in the west	2-3 Years	AD1 ATMS08 AD2 ATMS19 ATIS01 MC07 ATMS01 MC08 ATMS02 MC12	\$ 100,000.00 - \$ 160,000.00	\$ 2,000,000.00 - \$ 2,500,000.00	\$ 250,000.00 - \$ 325,000.00	\$ 2,350,000.00 - \$ 2,985,000.00
Lake Charles Transportation Management Center	Establish a Lake Charles Transportation Management Center (TMC)	TMC Operations to include: -Active monitoring of traffic conditions on state and federal routes -Disseminating information for emergencies, incidents, and amber alerts -Coordination for Traffic Incident Management -Agency outreach -Dispatching MAP ~2500 sq ft facility/addition	Lake Charles area - Coverage to include state and federal routes. TMC envisioned to be located within the DOTD District 07 Property on US 90.	2-4 Years	ATMS07	\$ 25,000.00 - \$ 120,000.00	\$ 500,000.00 - \$ 1,500,000.00	\$ 75,000.00 - \$ 375,000.00	\$ 600,000.00 - \$ 1,995,000.00
Lake Charles Traffic Signal Upgrades	Upgrade existing traffic signal corridors	Where needed, upgrade includes support poles, cabinets, controllers, detection, wiring, indications, signage, pedestrian access ramps, push buttons, wiring, communications, central system software, and integration. Operations of signal systems are based on owner agencies and agreements established.	State and Local Routes including the following: -Ryan St. -Lake Street -12th St. (LA 14 to Ryan) -Kirkman St -Common St -Louisiana Ave/Enterprise Blvd -LA 14 -Nelson Rd -LA 384 (Country Club Rd) -Prien Lake Rd -Broad St. -McNeese St.	2-5 Years	ATMS02 ATMS03	\$ 125,000.00 - \$ 200,000.00 \$ 60,000.00 - \$ 90,000.00 \$ 50,000.00 - \$ 80,000.00 \$ 65,000.00 - \$ 105,000.00 \$ 40,000.00 - \$ 65,000.00 \$ 75,000.00 - \$ 120,000.00 \$ 125,000.00 - \$ 200,000.00 \$ 75,000.00 - \$ 120,000.00 \$ 15,000.00 - \$ 25,000.00 \$ 75,000.00 - \$ 120,000.00 \$ 90,000.00 - \$ 145,000.00 \$ 40,000.00 - \$ 65,000.00	\$ 2,475,000.00 - \$ 2,775,000.00 \$ 1,155,000.00 - \$ 1,295,000.00 \$ 990,000.00 - \$ 1,110,000.00 \$ 1,320,000.00 - \$ 1,480,000.00 \$ 825,000.00 - \$ 925,000.00 \$ 1,485,000.00 - \$ 1,665,000.00 \$ 2,475,000.00 - \$ 2,775,000.00 \$ 1,485,000.00 - \$ 1,665,000.00 \$ 330,000.00 - \$ 370,000.00 \$ 1,485,000.00 - \$ 1,665,000.00 \$ 1,815,000.00 - \$ 2,035,000.00 \$ 825,000.00 - \$ 925,000.00	\$ 370,000.00 - \$ 620,000.00 \$ 175,000.00 - \$ 290,000.00 \$ 150,000.00 - \$ 250,000.00 \$ 200,000.00 - \$ 330,000.00 \$ 125,000.00 - \$ 205,000.00 \$ 225,000.00 - \$ 370,000.00 \$ 370,000.00 - \$ 620,000.00 \$ 225,000.00 - \$ 370,000.00 \$ 50,000.00 - \$ 85,000.00 \$ 225,000.00 - \$ 370,000.00 \$ 270,000.00 - \$ 455,000.00 \$ 125,000.00 - \$ 205,000.00	\$ 2,970,000.00 - \$ 3,295,000.00 \$ 1,390,000.00 - \$ 1,535,000.00 \$ 1,190,000.00 - \$ 1,320,000.00 \$ 1,585,000.00 - \$ 1,755,000.00 \$ 990,000.00 - \$ 1,095,000.00 \$ 1,785,000.00 - \$ 1,975,000.00 \$ 2,970,000.00 - \$ 3,295,000.00 \$ 1,785,000.00 - \$ 1,975,000.00 \$ 395,000.00 - \$ 440,000.00 \$ 1,785,000.00 - \$ 1,975,000.00 \$ 2,175,000.00 - \$ 2,415,000.00 \$ 990,000.00 - \$ 1,095,000.00
Lake Charles ITS Phase 3	Project to deploy ITS field equipment for the I-210 corridor through Lake Charles to support Incident Management	Project includes DMS, CCTV surveillance, vehicle detection, a motorist advisory system for the I-210 Bridge crossing Lake Charles/Calcasieu River, communications and integration. Field equipment to be operated by the LADOTD Statewide TMC/Lake Charles TMC	Along I-210 from I-10/I-210 Interchange (West) to I-10/I-210 Interchange (East)	4-5 Years	AD1 MC07 AD2 MC08 ATIS01 MC12 ATMS01 ATMS02 ATMS08 ATMS19	\$ 125,000.00 - \$ 200,000.00	\$ 2,500,000.00 - \$ 3,500,000.00	\$ 575,000.00 - \$ 1,015,000.00	\$ 3,200,000.00 - \$ 4,715,000.00
Lake Charles ITS Phase 4	Project to deploy ITS field equipment for the remainder of the I-10 corridor West to support Incident Management	Project includes DMS, CCTV surveillance, vehicle detection, communications and integration. Field equipment to be operated by the LADOTD Statewide TMC/Lake Charles TMC	I-10 from the I-10/I-210 Interchange in the West to the Texas State Line	5 Years	AD1 ATMS08 AD2 ATMS19 ATIS01 MC07 ATMS01 MC08 ATMS02 MC12	\$ 50,000.00 - \$ 80,000.00	\$ 1,000,000.00 - \$ 1,500,000.00	\$ 200,000.00 - \$ 450,000.00	\$ 1,250,000.00 - \$ 2,030,000.00
Lake Charles ITS Phase 5	Deployment of ITS to movable bridges	Automation of drawbridge including but not limited to access controls, indications, arms, barriers, CCTV	LA 387 drawbridge	5 Years	ATMS20	\$ 15,000.00 - \$ 25,000.00	\$ 300,000.00 - \$ 800,000.00	\$ 45,000.00 - \$ 200,000.00	\$ 360,000.00 - \$ 1,025,000.00
TOTALS						\$1,150,000.00 - \$ 1,931,000.00	\$ 24,205,000.00 - \$ 30,070,000.00	\$4,115,000.00 - \$ 7,330,000.00	\$ 30,190,000.00 - \$ 38,466,000.00

9.2 Operations and Maintenance of Regional ITSs

For efficient functioning of ITSs in any region, it is extremely important to identify operations and maintenance (O&M) responsibilities and resources. Typically, ITSs require more coordination and monitoring than conventional transportation assets due to its specialized nature. Hence, as part of this regional ITS architecture document, it is important to identify O&M resources and responsibilities.

Currently, LADOTD ITS Section (Section 56) is responsible for providing statewide ITS equipment O&M support for equipment on state and federal routes. LADOTD O&M for DOTD Traffic Signals are maintained by the district office or by a municipality through an agreement. On other routes, the agency responsible for the ITS is the facility owner. Typically, ITS maintenance activities are performed on an as-needed basis. Every regional ITS does not have dedicated funding source/structure for periodic maintenance of the system. As the transportation funding resources struggle to keep up with the demand, it is critical to understand the capital cost versus O&M cost balance over the life-cycle of any ITS. As the Lake Charles region prepares to expand and enhance existing ITS, it is critical to identify which agency will be responsible for a proposed ITS and how much resources will be required for O&M of the system. Considering a dedicated annual budget for ITS deployment in the region, it is understandable that the more ITS deployment in the region, the less money will be available for new ITS deployment in successive time periods.

In this document, subject O&M resource/responsibilities have been covered under two different sections: one defining agency O&M responsibilities and the other specifying O&M funding requirements. In **Table 6**, maintenance responsibilities have been identified/assigned to a particular agency for each applicable market package. Although, such O&M arrangements may differ at a project level based on specific agencies involved, the operations and maintenance requirements section under each market package provides guidelines on which agency should assume the maintenance responsibilities for each ITS component.

As far as the long term funding is considered, there is currently no dedicated long term maintenance funding for any ITS in the region. LADOTD currently has a statewide maintenance budget of \$2 million, which serves for both routine and emergency maintenance. **Table 7** above not only identifies capital cost requirements for ITS but also provides O&M funding requirements for all the planned ITSs. For most systems, an estimated dollar figure is provided as the O&M cost; in the case where a dollar value is not provided, 10% of capital cost shall be assumed as the O&M cost per year.

9.3 ITS Funding

As mentioned earlier, currently there is no dedicated funding source for ITS deployments in the Lake Charles region. LADOTD ITS Section is budgeted \$10 million each year as part of highway funding program, which is allocated statewide on a prioritized basis depending on immediate need. Although, some part of this money is typically allocated to each region, there is currently no dedicated funding source for ITS in Lake Charles regional Transportation Improvement Program (TIP) to cover all the identified projects. As part of the follow-up to this architecture effort, it is recommended that Imperial Calcasieu Regional Planning & Development Commission (IMCAL), being the regional planning entity, work together with LADOTD and the other Lake Charles stakeholder and pursue funding sources for the ITS deployment within the region.

10 Architecture Maintenance Plan

This section discusses the proposed Maintenance Plan for the regional ITS Architecture.

FHWA's Final Rule on ITS Architecture and Standards (23 CFR Part 940) requires development of an architecture maintenance plan. Paragraph 940.9 (f) states that:

"The agencies and other stakeholders participating in the development of the regional ITS architecture shall develop and implement procedures and responsibilities for maintaining it, as needs evolve within the region."

In January 2004, FHWA issued guidance¹ on what should be contained in an architecture maintenance plan in order to be compliant with FHWA requirements. The White Paper on this subject is available at http://ops.fhwa.dot.gov/its_arch_imp/guidance.htm. The Maintenance Plan for the Lake Charles Regional ITS Architecture is based on the guidelines provided by FHWA's White Paper.

This report provides some background on the need for architecture maintenance and addresses key issues under the following headings:

- Why Maintain a Regional ITS Architecture?
- Who Will Maintain the Architecture?
- When will the Architecture be updated?
- What will be maintained?
- How will the Architecture be maintained?

10.1 Why Maintain a Regional ITS Architecture?

A Regional ITS Architecture is "a regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects or groups of projects". Paragraph 940.9 (a) states that:

"A regional ITS architecture shall be developed to guide the development of ITS projects and programs and be consistent with ITS strategies and projects contained in applicable transportation plans. The National ITS Architecture shall be used as a resource in the development of the regional ITS architecture. The regional ITS architecture shall be on a scale commensurate with the scope of ITS investment in the region. Provision should be made to include participation from the following agencies, as appropriate, in the development of the regional ITS architecture: Highway agencies; public safety agencies (e.g., police, fire, emergency/medical); transit operators; Federal lands agencies; State motor carrier agencies; and other operating agencies necessary to fully address regional ITS integration."

As ITS projects are implemented, the regional ITS architecture will need to be updated to reflect new ITS priorities and strategies that emerge through the transportation planning process. It will also need to be updated to account for expansion in ITS scope and to allow for the evolution and incorporation of new ideas. The goal of the maintenance plan is to guide controlled updates to the regional ITS architecture baseline so that it continues to accurately reflect the region's existing ITS capabilities and future plans.

¹ FHWA-HOP-04-004, Regional ITS Architecture Maintenance White Paper, prepared by the National ITS Architecture Team, January 31, 2004

10.2 Who Will Maintain The Architecture?

To maintain a consensus regional ITS architecture, ideally all stakeholders should participate in the process. In practice, typically, one or two agencies take the lead responsibility to maintain the regional ITS architecture. The primary requirements of the regional architecture maintainer are the mission/authority to perform such functions and the necessary skills to perform the same. The mission of the ITS architecture maintainer most closely resembles a regional planning body that, as consistent with its mission, has the authority to initiate, update, and document changes in regional planning documents. For the Lake Charles Regional ITS Architecture, the LADOTD will assume the role of the ITS Architecture keeper and maintainer as indicated in Section 3.4.

Like the regional transportation plans, architecture maintenance is recurring, and is a necessary long-term effort. To be effective in ITS architecture maintenance, LADOTD will need to have staff that:

- Is knowledgeable of the existing regional ITS architecture. This implies a detailed technical understanding of the various parts of the architecture and how changes would affect each part.
- Has an understanding of transportation systems in the region. This understanding can reside jointly in the group of agencies/ stakeholders who participate in the maintenance process.
- Has an understanding of the tools used to create (and to update) the architecture. This might include, for example, knowledge of the Turbo Architecture™ tool, if that is used to hold some of the architecture information.

As the agency responsible for maintaining the architecture, the LADOTD needs to have the skills within its own organization and/or use a qualified consultant. In either case, the agency needs the necessary funding to support the maintenance effort. The following are the recommended minimum resources for ITS architecture maintenance management:

- One individual to be the ITS architecture manager
- Two individuals trained in Turbo Architecture™ and ITS Planning (Considering this is a new functional/skill area, the training will need to be comprehensive and will require resources: three work days for Turbo™ training and four weeks spread over the month to study regional and national architecture documents)
 - Approximately 16 man-hours per month for ITS architecture maintenance activities. This may be performed by the manager or designee.
 - Manage the update of the Regional ITS Architecture Turbo Architecture source file with project level ITS architectures
 - Facilitate ITS Steering Committee meetings annually. The ITS Steering Committee is made up of representative from each stakeholder in the region.

Additionally, LADOTD will use a qualified consultant to assist with the ITS architecture maintenance activities. LADOTD has on a retainer contract a professional engineer consulting firm to provide ITS TIM Program TMC Operations Staffing and Systems Engineering Support.

Although LADOTD will lead the architecture maintenance activities, like all other regional planning activities, ITS architecture maintenance will take close coordination between several agencies. LADOTD will need to coordinate with other major stakeholders* in the region, including:

- Louisiana Department of Transportation and Development (LADOTD) District 07
- Louisiana Department of Transportation and Development (LADOTD) ITS Section
- Louisiana State Police (Troop D)

-
- Imperial Calcasieu Regional Planning & Development Commission (IMCAL)
 - Calcasieu Parish Sheriff's Department
 - Calcasieu Parish Police Jury
 - City of Lake Charles

*Note – Other stakeholders may be included as necessary based on ITS development and deployment activities.

As LADOTD takes responsibility for architecture maintenance, they will use agreements to create a management/oversight function (e.g. a "Regional ITS Architecture Maintenance Committee") to oversee regional ITS architecture maintenance work, which would have representation from the key stakeholders to the agreement as listed above. At minimum, such a committee will include two LADOTD representatives, one IMCAL representative, and one FHWA representative.

It is proposed that such a Regional ITS Architecture Maintenance Committee will be responsible for recommending/presenting the proposed changes to the MPO Technical Advisory Committee. (Same committee that approves regional planning documents). The Regional ITS Architecture Maintenance Committee will meet annually to report/discuss any changes to ITSs in the region. All the regional stakeholders will be responsible for informing/updating the regional maintenance committee about new ITS deployments in their region. The architecture maintenance committee will also be responsible for following up with all of the regional stakeholders to ensure that any and all ITS deployments are reported and documented in the regional plan.

Following this architecture adoption by the MPO, it is recommended that the Regional ITS Architecture Maintenance Committee meet at least once a year to:

- Review progress in ITS implementation projects
- Verify that the regional ITS architecture Turbo Architecture™ source file is kept up to date with the region's ITS projects
- Update plans for future deployments by each regional stakeholder
- Review changes in State and National ITS Architectures, regulations, and requirements, if any
- Determine any needs for an update to the Lake Charles Regional ITS Architecture

10.3 When will the architecture be updated?

The regional ITS architecture is not static. It must change as plans change, as ITS projects are implemented, and as the ITS needs and services evolve in the region.

At a minimum, the regional ITS architecture will be reviewed annually by the Regional ITS Architecture Maintenance Committee. The Regional ITS Architecture Maintenance Committee may meet and perform architecture updates more frequently to keep with the pace of the region's ITS implementation. Annual or more frequent updates will include integrating completed projects into the regional ITS architecture Turbo Architecture™ source file. A one page summary of the change will be added as an appendix to the regional ITS architecture document.

Regardless of the frequency selected for periodic updates, it is recommended that the Committee recognize the potential need for “Exception Maintenance” to occur in the event of major project implementations, major revisions to the National ITS Architecture, or to meet the requirements of future regulations.

It is recommended that the regional ITS architecture is fully updated every five years, prior to the periodic updating of the Regional Transportation Improvement Program, which occurs once a year.

Upon recommendation of the Regional Architecture Maintenance Committee, the MPO Technical Advisory Committee will make a resolution to accept any revisions/changes/updates to the ITS architecture.

The following list includes many of the events that may cause change to a regional ITS architecture:

10.3.1 Changes in Regional Needs

Regional ITS architectures are created to support transportation planning in addressing regional needs. Over time these needs can change and the corresponding aspects of the regional ITS architecture that addresses these needs may need to be updated. These changes in needs should be expressed in updates to planning documents such as the Regional Transportation Plan.

10.3.2 New stakeholders

New stakeholders become active in ITS and the regional ITS architecture should be updated to reflect their place in the regional view of ITS elements, interfaces, and information flows. New stakeholders might represent new organizations that were not in place during the original development of the regional ITS architecture.

10.3.3 Changes in scope of services considered

The range of services considered by the regional ITS architecture expands. This might happen because the National ITS Architecture has been expanded and updated to include new user services or to better define how existing elements satisfy the user services. The National ITS Architecture may have expanded to include a user service that has been discussed in a region, but not in the regional ITS architecture, or was included in only a very cursory manner. Changes in the National ITS Architecture are not of themselves a reason to update a regional ITS architecture, but a region may want to consider any new services in the context of their regional needs.

10.3.4 Changes in stakeholder or element names

An agency’s name or the name used to describe their element(s) undergoes change. Transportation agencies occasionally merge, split, or just rename themselves. In addition, element names may evolve as projects are defined. The regional ITS architecture should be updated to use the current, correct names for both stakeholders and elements.

10.3.5 Changes in other architectures

A regional ITS architecture covers not only elements and interfaces within a region, but also interfaces to elements in adjoining regions. Changes in the regional ITS architecture in one region may necessitate changes in the architecture in an adjoining region to maintain consistency between the two. Architectures may also overlap (e.g. a statewide ITS architecture and a regional ITS architecture for a region within the state) and a change in one might necessitate a change in the other.

There are several changes relating to project definition that will cause the need for updates to the regional ITS architecture.

10.3.6 Changes due to Project Definition or Implementation

When actually defined or implemented, a project may add, subtract or modify elements, interfaces, or information flows from the regional ITS architecture. Because the regional ITS architecture is meant to describe the current, as well as future, regional implementation of ITS, it must be updated to correctly reflect how the developed projects integrate into the region.

10.3.7 Changes due to Project Addition/Deletion

Occasionally a project will be added or deleted through the planning process, or through project delivery, and some aspects of the regional ITS architecture that are associated with the project may be expanded, changed, or removed.

10.3.8 Changes in Project Priority

Due to funding constraints, or other considerations, the planned project sequencing may change. Delaying a project may have a ripple effect on other projects that depend on it. Raising the priority for a project's implementation may impact other projects that are related to it.

10.4 What will be maintained?

Those constituent parts of a regional ITS architecture that will be maintained are referred to as the "baseline". This section considers the different "parts" of the regional ITS architecture and whether they should be a part of the baseline. Baseline parts are annually updated within the regional ITS architecture Turbo file and every five years within the document. The parts discussed are:

- Description of Region
- List of Stakeholders
- Operational Concepts
- List of ITS Elements
- List of Agreements
- Interfaces between Elements
- System Functional Requirements
- Applicable ITS Standards
- Project Sequencing

One of the benefits of a regional ITS architecture is to enable the efficient exchange of information between ITS elements in a region and with elements outside the region. Efficiency refers to the economical deployment of ITS elements and their interfaces. The result of these ITS deployments should be contributions to the safe and efficient operation of the surface transportation network. Each of the components in the regional ITS architecture below have a role in this economy and an appropriate effort should be levied to maintain them.

10.4.1 Description of Region

This description includes the geographic scope, functional scope, and architecture timeframe, and helps frame each of the following parts of a regional ITS architecture. Geographic scope defines the ITS elements that are "in" the region, although additional ITS elements outside the region may be needed to be described if they communicate ITS information to elements inside the region. Functional scope defines which services are included in a regional ITS architecture. Architecture timeframe is the distance (in years) into the future that the regional ITS architecture

will consider. The description of the region is usually contained in an architecture document, but may reside in a database containing aspects of the regional ITS architecture, and should certainly be a part of the baseline.

10.4.2 List of Stakeholders

Stakeholders are of great importance to the definition of the architecture. Within a region, they may consolidate or separate and such changes should be reflected in the architecture. Furthermore, stakeholders that have not been engaged in the past may be approached through outreach to be sure that the regional ITS architecture represents their ITS requirements as well. The stakeholders should be described in architecture documentation (and may also reside in a database representing aspects of the regional ITS architecture). Their listing and description should be part of the baseline.

10.4.3 Operational Concepts

It is crucial that the operational concepts which might be represented as roles and responsibilities or as customized market packages in a regional ITS architecture accurately represent the consensus vision of how the stakeholders want their ITS to operate for the benefit of surface transportation users. These should be reviewed and, if necessary, changed to represent both what has been deployed (which may have been shown as “planned” in the earlier version of the regional ITS architecture) and the current consensus view of the stakeholders. Many of the remaining maintenance efforts will depend on the outcome of the changes made here. The operational concept will reside in the architecture documentation and possibly in a diagramming tool if a customized market package approach is used, and should be part of the baseline.

10.4.4 List of ITS Elements

The inventory of ITS elements is a key aspect of the regional ITS architecture. Changes in stakeholders as well as operational concepts may impact the inventory of ITS elements. Furthermore, recent implementation of ITS elements may change their individual status (e.g. from planned to existing). The list of elements is often contained in architecture documentation and is key information in any architecture database. It is a key aspect of the baseline.

10.4.5 List of Agreements

One of the greatest values of a regional ITS architecture is to identify where information will cross an agency boundary, which may indicate a need for an agency agreement. An update to the list of agreements can follow the update to the Operational Concept and/or interfaces between elements. The list of agreements will usually be found in the architecture documentation. This listing should be a part of the baseline.

10.4.6 Interfaces between Elements

Interfaces between elements define the “details” of the architecture. They are the detailed description of how the various ITSs are or will be integrated throughout the timeframe of the architecture. These details are usually held in an architecture database. They are a key aspect of the architecture baseline and one that will likely see the greatest amount of change during the maintenance process.

10.4.7 System Functional Requirements

High-level functions are allocated to ITS elements as part of the regional ITS architecture. These can serve as a starting point for the functional definition of projects that map to portions of the regional ITS architecture. Because of the level of detail, these are usually held in spreadsheets or databases, but may be included in the architecture document. They are a part of the baseline.

10.4.8 Applicable ITS Standards

The selection of standards depends on the information exchange requirements. But in addition, the maintenance process should consider how ITS standards may have evolved and matured since the last update and consider how any change in the “standards environment” may impact previous regional standards choices (especially where competing standards exist). For example, if Extensive Markup Language (XML) based Center-To-Center standards reach a high level of maturity, reliability, and cost-effectiveness, then a regional standards technology decision may be made to transition from investments in other standards technologies (e.g. Common Object Request Broker Architecture (CORBA) to XML). The description of the standards environment for the region, as well as the details of which standards apply to the architecture, should be part of the baseline.

10.4.9 Project Sequencing

While project sequencing is partly determined by functional dependencies (e.g. “surveillance” must be a precursor to “traffic management”), the reality is that most project sequences are local policy decisions. Project sequences should be reviewed to make sure that they are in line with current policy decisions. Furthermore, policy makers should be informed of the sequences and their input should be sought to make the project sequences coincide with their expectations. This is crucial to eliminate the possibility of the regional ITS architecture becoming irrelevant. The project sequencing should be included in the architecture documentation and may also be held in a spreadsheet or database. These should be part of the architecture baseline.

10.5 How will the architecture be maintained?

LADOTD ITS Section (Section 56) will oversee and ensure that the regional architecture is maintained. LADOTD will utilize its contracted consulting services contract for ITS Traffic Incident Management (TIM) Program TMC Operations Staffing and Systems Engineering Support for this effort. The guidelines contained within FHWA’s *Regional ITS Architecture Maintenance White Paper* will be helpful in guiding the maintenance effort. In addition to detailing the recommended maintenance process, the White Paper also contains examples of Maintenance Plans developed by a range of agencies and regions throughout the country.

11 Functional Requirements

Each ITS operated by the stakeholders must perform certain functions to effectively deliver the ITS services desired by the region. The primary functions that each system needs to perform are broadly defined in the Lake Charles Regional ITS Architecture. The high-level requirements are grouped into functional areas that identify requirements associated with each selected ITS service.

Due to the sheer magnitude of the functional requirements, the document requirements have not been fully included within the written regional ITS architecture. However, the functional requirements are available by running a report from the regional ITS architecture Turbo Architecture source file which can be made available upon request to the LADOTD ITS Section.

Table 8: Functional Requirement (Sample)

Element Name	Entity Name	Functional Area	Functional Area Description	Req ID	Requirement	Status
Calcasieu Parish 911	Emergency Mgmt	Incident Command	Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.	1	The center shall provide tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders to support local management of an incident.	Existing
				2	The center shall provide incident command communications with public safety, emergency management, transportation, and other allied response agency centers.	Existing
				3	The center shall track and maintain resource information and action plans pertaining to the incident command.	Existing
				4	The center shall share incident command information with other public safety agencies including resource deployment status, hazardous material information, rail incident information, evacuation advice as well as traffic, road, and weather conditions.	Existing

For the entire table of functional requirements, see the regional ITS architecture Turbo Architecture source file.

12 ITS Standards

Standardizing the flow of information between the systems is essential to cost-effectively integrating ITS throughout the region. ITS standards are fundamental to the establishment of an open ITS environment that achieves the goal of interoperability for ITS. Standards facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances and new approaches evolve.

Establishing standards for exchanging information among ITS is important not only from an interoperability point of view, it also provides interchangeability and expandability thereby reducing risk and cost. Since an agency using standardized interfaces can select among multiple vendors for products and applications, competition is maintained and prices are lower in the long term.

Standards Development Organizations (SDO) are developing ITS standards that support interoperability and interchangeability. Several of the communication standards overlap in applicability. This provides flexibility in the design of ITS allowing agencies to choose the most applicable standard for their needs. Before systems are designed, all stakeholders involved in the applicable ITS service(s) should decide upon the standards and their specifics that will be used. Once a decision is made, all future systems should use the agreed upon standards.

Table 9: ITS Standards

Group	SDO	Document ID	Standard Title	Standard Type	User Defined
No	AASHTO/ITE	ITE TMDD	Traffic Management Data Dictionary (TMDD) and Message Sets for External Traffic Management Center Communications (MS/ETMCC)	Message/Data	No
No	AASHTO/ITE/ NEMA	NTCIP 1201	Global Object Definitions	Message/Data	No
No	AASHTO/ITE/ NEMA	NTCIP 1202	Object Definitions for Actuated Traffic Signal Controller (ASC) Units	Message/Data	No
No	AASHTO/ITE/ NEMA	NTCIP 1203	Object Definitions for Dynamic Message Signs (DMS)	Message/Data	No
No	AASHTO/ITE/ NEMA	NTCIP 1204	Object Definitions for Environmental Sensor Stations (ESS)	Message/Data	No
No	AASHTO/ITE/ NEMA	NTCIP 1205	Object Definitions for Closed Circuit Television (CCTV) Camera Control	Message/Data	No
No	AASHTO/ITE/ NEMA	NTCIP 1206	Object Definitions for Data Collection and Monitoring (DCM) Devices	Message/Data	No
No	AASHTO/ITE/ NEMA	NTCIP 1208	Object Definitions for Closed Circuit Television (CCTV) Switching	Message/Data	No
No	AASHTO/ITE/ NEMA	NTCIP 1209	Data Element Definitions for Transportation Sensor Systems (TSS)	Message/Data	No
No	AASHTO/ITE/ NEMA	NTCIP 1210	Field Management Stations (FMS) - Part 1: Object Definitions for Signal System Masters	Message/Data	No
No	AASHTO/ITE/ NEMA	NTCIP 1211	Object Definitions for Signal Control and Prioritization (SCP)	Message/Data	No
No	AASHTO/ITE/ NEMA	NTCIP 1214	Object Definitions for Conflict Monitor Units (CMU)	Message/Data	No
No	ASTM	ASTM E2468-05	Standard Practice for Metadata to Support Archived Data Management Systems	Other	No

Group	SDO	Document ID	Standard Title	Standard Type	User Defined
No	ASTM	ASTM E2665-08	Standard Specifications for Archiving ITS-Generated Traffic Monitoring Data	Message/Data	No
Yes	AASHTO/ITE/NEMA	NTCIP C2C	National Transportation Communications for Intelligent Transportation System Protocol (NTCIP) Center-to-Center Standards Group	Group	No
Yes	AASHTO/ITE/NEMA	NTCIP C2F	NTCIP Center-to-Field Standards Group	Group	No
Yes	IEEE	IEEE IM	Incident Management Standards Group	Group	No
Yes	SAE	ATIS General Use	Advanced Traveler Information Systems (ATIS) General Use Standards Group	Group	No

13 Agreements

This section identifies the list of existing and future agreements between each of the stakeholder organizations who's ITSs will be exchanging information was generated prior to implementing relevant projects. This list identifies the agreements that should be established but does not define the agreements themselves.

Table 10: Agreements

Agreement Title	Agreement Status	Description	Lead Stakeholder	Associated Stakeholders
Traffic Signal Maintenance Agreement - DOTD/Lake Charles	Existing	Agreement between LA DOTD and City of Lake Charles for providing maintenance and operations of traffic signals at state intersections within the city limits. Maintenance and operations include: payment for electricity, inspection, replacement of inoperative light bulbs and fuses, and straightening of signal heads and signs.	LADOTD	City of Lake Charles
Traffic Signal Maintenance Agreement- Calcasieu/Lake Charles	Existing	Agreement between Calcasieu Parish and City of Lake Charles for providing maintenance and operations of traffic signals at the intersections of Nelson Road and Gauthier Road as well as the intersection of Nelson Road and Ham Reid Road.	Calcasieu Parish Police Jury	City of Lake Charles
Video Access Agreement - LADOTD/Public Safety Agencies/Emergency Medical	Planned	With the deployment of CCTV cameras in the Lake Charles Region, public safety agencies and emergency medical providers would benefit with having direct access to the live video feeds. The agreement would include but not be limited to: access, operations,	LADOTD	Calcasieu Parish Police Jury
				City of Lake Charles
				City of Sulphur
				LADOTD
				Local Public Safety Agencies

Agreement Title	Agreement Status	Description	Lead Stakeholder	Associated Stakeholders
		maintenance, communications, cost sharing, and quality of service.		Louisiana State Police
Regional Motorist Assistance Patrol S.P. No. 737-97-0047	Existing	Cooperative endeavor agreement between DOTD and Calcasieu Parish Sheriff's Office for providing motorist assistance patrol along I-10 and I-210 within the Lake Charles Region.	LADOTD	Local Public Safety Agencies

Appendix A - Architecture Flow Definitions

Flow Name	Description
alert notification	Notification of a major emergency such as a natural or man-made disaster, civil emergency, or child abduction for distribution to the public. The flow identifies the alert originator, the nature of the emergency, the geographic area affected by the emergency, the effective time period, and information and instructions necessary for the public to respond to the alert. This flow may also identify specific information that should not be released to the public.
alert notification coordination	Coordination of emergency alerts to be distributed to the public. This includes notification of a major emergency such as a natural or man-made disaster, civil emergency, or child abduction for distribution to the public and status of the public notification.
alert status	Information indicating the current status of the emergency alert including identification of the traveler and driver information systems that are being used to provide the alert.
archive requests	A request to a data source for information on available data (i.e. "catalog") or a request that defines the data to be archived. The request can be a general subscription intended to initiate a continuous or regular data stream or a specific request intended to initiate a one-time response from the recipient.
archive status	Notification that data provided to an archive contains erroneous, missing, or suspicious data or verification that the data provided appears valid. If an error has been detected, the offending data and the nature of the potential problem are identified.
archived data product requests	A user-specified request for archived data products (i.e. data, meta data, or data catalogs). The request also includes information that is used to identify and authenticate the user and support electronic payment requirements, if any.
archived data products	Raw or processed data, meta data, data catalogs, and other data products provided to a user system upon request. The response may also include any associated transaction information.
current asset restrictions	Restrictions levied on transportation asset usage based on infrastructure design, surveys, tests, or analyses. This includes standard facility design height, width, and weight restrictions, special restrictions such as spring weight restrictions, and temporary facility restrictions that are imposed during maintenance and construction.
data collection and monitoring control	Information used to configure and control data collection and monitoring systems.
emergency archive data	Logged emergency information including information that characterizes identified incidents (routine highway incidents through disasters), corresponding incident response information, evacuation information, surveillance data, threat data, and resource information. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
emergency operations inputs	Emergency operator inputs supporting call taking, dispatch, emergency operations, security monitoring, and other operations and communications center operator functions.
emergency operations status	Presentation of information to the operator including emergency operations data, supporting a range of emergency operating positions including call taker, dispatch, emergency operations, security monitoring, and various other operations and communications center operator positions.
emergency plan coordination	Information that supports coordination of emergency management plans, continuity of operations plans, emergency response and recovery plans, evacuation plans, and other emergency plans between agencies. This includes general plans that are coordinated prior to an incident and shorter duration tactical plans that are prepared during an incident.
emergency traffic control information	Status of a special traffic control strategy or system activation implemented in response to an emergency traffic control request, a request for emergency access routes, a request for evacuation, a request to activate closure systems, a request to employ driver information systems to support public safety objectives, or other special requests. Identifies the selected traffic control strategy and system control status.
emergency traffic control request	Special request to preempt the current traffic control strategy in effect at one or more signalized intersections or highway segments, activate traffic control and closure systems such as gates and barriers, activate safeguard systems, or use driver information systems. For example, this flow can request all signals to red-flash, request a progression of traffic control preemptions along an emergency vehicle route, request a specific evacuation traffic control plan, request activation of a road closure barrier system, or place a public safety or emergency-related message on a dynamic message sign.
equipment maintenance status	Current status of field equipment maintenance actions.
evacuation coordination	Coordination of information regarding a pending or in-process evacuation. Includes evacuation zones, evacuation times, evacuation routes, forecast network conditions, and reentry times.
evacuation information	Evacuation instructions and information including evacuation zones, evacuation times, and reentry times.

Flow Name	Description
event information	Special event information for travelers. This would include a broader array of information than the similar "event plans" that conveys only information necessary to support traffic management for the event.
event information request	Request for special event information.
external reports	Traffic and incident information that is collected by the media through a variety of mechanisms (e.g., radio station call-in programs, air surveillance).
field device status	Reports from field equipment (sensors, signals, signs, controllers, etc.) which indicate current operational status.
field equipment status	Identification of field equipment requiring repair and known information about the associated faults.
incident command information coordination	Information that supports local management of an incident. It includes resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response.
incident information	Notification of existence of incident and expected severity, location, time and nature of incident. As additional information is gathered and the incident evolves, updated incident information is provided. Incidents include any event that impacts transportation system operation ranging from routine incidents (e.g., disabled vehicle at the side of the road) through large-scale natural or human-caused disasters that involve loss of life, injuries, extensive property damage, and multi-jurisdictional response. This also includes special events, closures, and other planned events that may impact the transportation system.
incident notification	The notification of an incident including its nature, severity, and location.
incident notification response	Interactive acknowledgement and verification of the incident information received, requests for additional information, and general information on incident response status.
incident report	Report of an identified incident including incident location, type, severity and other information necessary to initiate an appropriate incident response.
incident response coordination	Incident response procedures and current incident response status that are shared between allied response agencies to support a coordinated response to incidents. This flow provides current situation information, including a summary of incident status and its impact on the transportation system and other infrastructure, and current and planned response activities. This flow also coordinates a positive hand off of responsibility for all or part of an incident response between agencies.
incident response status	Status of the current incident response including a summary of incident status and its impact on the transportation system, traffic management strategies implemented at the site (e.g., closures, diversions, traffic signal control overrides), and current and planned response activities.
interactive traveler information	Traveler information provided in response to a traveler request. The provided information includes traffic and road conditions, advisories, incidents, payment information, transit services, parking information, weather information, and other travel-related data updates and confirmations.
ISP coordination	Coordination and exchange of transportation information between centers. This flow allows a broad range of transportation information collected by one ISP to be redistributed to many other ISPs and their clients.
logged vehicle routes	Anticipated route information for guided vehicles, special vehicles (e.g., oversize vehicles) or groups of vehicles (e.g., governor's motorcade) that may require changes in traffic control strategy.
maint and constr archive data	Information describing road construction and maintenance activities identifying the type of activity, the work performed, and work zone information including work zone configuration and safety (e.g., a record of intrusions and vehicle speeds) information. For construction activities, this information also includes a description of the completed infrastructure, including as-built plans as applicable. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
maint and constr resource coordination	Request for road maintenance and construction resources that can be used in the diversion of traffic (cones, portable signs), clearance of a road hazard, repair of ancillary damage, or any other incident response.
maint and constr resource request	Request for road maintenance and construction resources that can be used in the diversion of traffic (cones, portable signs), clearance of a road hazard, repair of ancillary damage, or any other incident response. The request may poll for resource availability or request pre-staging, staging, or immediate dispatch of resources.
maint and constr resource response	Current status of maintenance and construction resources including availability and deployment status. General resource inventory information covering vehicles, equipment, materials, and people and specific resource deployment status may be included.
maint and constr work plans	Future construction and maintenance work schedules and activities including anticipated closures with anticipated impact to the roadway, alternate routes, anticipated delays, closure times, and durations.
map update request	Request for a map update which could include a new underlying map or map layer updates.

Flow Name	Description
map updates	Map update which could include a new underlying static or real-time map or map layer(s) update.
probe archive data	Probe data that allows calculation of travel times, volumes, and other measures that support transportation planning. Optionally, this flow also includes origin and destination information for vehicles that opt to provide this information.
remote surveillance control	The control commands used to remotely operate another center's sensors or surveillance equipment so that roadside surveillance assets can be shared by more than one agency.
resource coordination	Coordination of resource inventory information, specific resource status information, resource prioritization and reallocation between jurisdictions, and specific requests for resources and responses that service those requests.
resource deployment status	Status of resource deployment identifying the resources (vehicles, equipment, materials, and personnel) available and their current status. General resource inventory information and specific status of deployed resources may be included.
resource request	A request for resources to implement special traffic control measures, assist in clean up, verify an incident, etc. The request may poll for resource availability or request pre-staging, staging, or immediate deployment of resources. Resources may be explicitly requested or a service may be requested and the specific resource deployment may be determined by the responding agency.
road network conditions	Current and forecasted traffic information, road and weather conditions, and other road network status. Either raw data, processed data, or some combination of both may be provided by this architecture flow. Information on diversions and alternate routes, closures, and special traffic restrictions (lane/shoulder use, weight restrictions, width restrictions, HOV requirements) in effect is included along with a definition of the links, nodes, and routes that make up the road network.
road network status assessment	Assessment of damage sustained by the road network including location and extent of the damage, estimate of remaining capacity, required closures, alternate routes, necessary restrictions, and time frame for repair and recovery.
road network traffic probe data	Aggregated route usage, travel times, and other aggregated data collected from probe vehicles that can be used to estimate current traffic conditions.
roadside archive data	A broad set of data derived from roadside sensors that includes current traffic conditions, environmental conditions, and any other data that can be directly collected by roadside sensors. This data also indicates the status of the sensors and reports of any identified sensor faults.
roadway equipment coordination	The direct flow of information between field equipment. This includes transfer of information between sensors and driver information systems (e.g., DMS, HAR) or control devices (e.g., traffic signals, ramp meters), direct coordination between adjacent control devices, interfaces between detection and warning or alarm systems, and any other direct communications between field equipment. This includes information exchanged between a Signal System Master (SSM) and the Signal System Local (SSL) equipment.
roadway information system data	Information used to initialize, configure, and control roadside systems that provide driver information (e.g., dynamic message signs, highway advisory radio, beacon systems). This flow can provide message content and delivery attributes, local message store maintenance requests, control mode commands, status queries, and all other commands and associated parameters that support remote management of these systems.
roadway information system status	Current operating status of dynamic message signs, highway advisory radios, beacon systems, or other configurable field equipment that provides dynamic information to the driver.
roadway maintenance status	Summary of maintenance fleet operations affecting the road network. This includes the status of winter maintenance (snow plow schedule and current status).
security equipment maintenance status	Current status of security surveillance and sensor field equipment maintenance actions.
security field equipment status	Identification of security sensors and surveillance equipment requiring repair and known information about the associated faults.
signal control data	Information used to configure and control traffic signal systems.
signal control status	Status of surface street signal controls including operating condition and current operational state.
speed monitoring control	Information used to configure and control automated speed monitoring, speed warning, and speed enforcement systems.
speed monitoring information	System status including current operational state and logged information including measured speeds, warning messages displayed, and violation records.
traffic archive data	Information describing the use and vehicle composition on transportation facilities and the traffic control strategies employed. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.

Flow Name	Description
traffic control coordination	Information transfers that enable remote monitoring and control of traffic management devices. This flow is intended to allow cooperative access to, and control of, field equipment during incidents and special events and during day-to-day operations. This flow also allows 24-hour centers to monitor and control assets of other centers during off-hours, allows system redundancies and fail-over capabilities to be established, and otherwise enables integrated traffic control strategies in a region.
traffic flow	Raw and/or processed traffic detector data which allows derivation of traffic flow variables (e.g., speed, volume, and density measures) and associated information (e.g., congestion, potential incidents). This flow includes the traffic data and the operational status of the traffic detectors.
traffic images	High fidelity, real-time traffic images suitable for surveillance monitoring by the operator or for use in machine vision applications. This flow includes the images and the operational status of the surveillance system.
traffic information coordination	Traffic information exchanged between TMCs. Normally would include incidents, congestion data, traffic data, signal timing plans, and real-time signal control information.
traffic probe data	Vehicle data that is used to determine traffic conditions. In a basic implementation, the data could be limited to time stamped unique identifiers that can be used to measure a vehicle's progress through the network. In more advanced implementations, the vehicle may report current position, speed, and heading and snapshots of recent events including route information, starts and stops, speed changes, and other information that can be used to estimate traffic conditions.
traffic sensor control	Information used to configure and control traffic sensor systems.
transit archive data	Data used to describe and monitor transit demand, fares, operations, and system performance. Content may include a catalog of available information, the actual information to be archived and associated meta data that describes the archived information.
transportation information for operations	Information on the state of transportation system operations including traffic and road conditions, advisories, incidents, transit service information, weather information, parking information, and other related data.
transportation system status	Current status and condition of transportation infrastructure (e.g., tunnels, bridges, interchanges, TMC offices, maintenance facilities). In case of disaster or major incident, this flow provides an assessment of damage sustained by the surface transportation system including location and extent of the damage, estimate of remaining capacity and necessary restrictions, and time frame for repair and recovery.
traveler alerts	Traveler information alerts reporting congestion, incidents, adverse road or weather conditions, parking availability, transit service delays or interruptions, and other information that may impact the traveler. Relevant alerts are provided based on traveler-supplied profile information including trip characteristics and preferences.
traveler archive data	Data associated with traveler information services including service requests, facility usage, rideshare, routing, and traveler payment transaction data. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
traveler information for media	General traveler information regarding incidents, unusual traffic conditions, transit issues, or other advisory information that has been desensitized and provided to the media.
traveler profile	Information about a traveler including equipment capabilities, personal preferences, and traveler alert subscriptions.
traveler request	A request for traveler information including traffic, transit, toll, parking, road weather conditions, event, and passenger rail information. The request identifies the type of information, the area of interest, parameters that are used to prioritize or filter the returned information, and sorting preferences.
video surveillance control	Information used to configure and control video surveillance systems.
work zone information	Summary of maintenance and construction work zone activities affecting the road network including the nature of the maintenance or construction activity, location, impact to the roadway, expected time(s) and duration of impact, anticipated delays, alternate routes, and suggested speed limits. This information may be augmented with images that provide a visual indication of current work zone status and traffic impacts.

Appendix B - Lake Charles Regional ITS Architecture Interface Diagrams

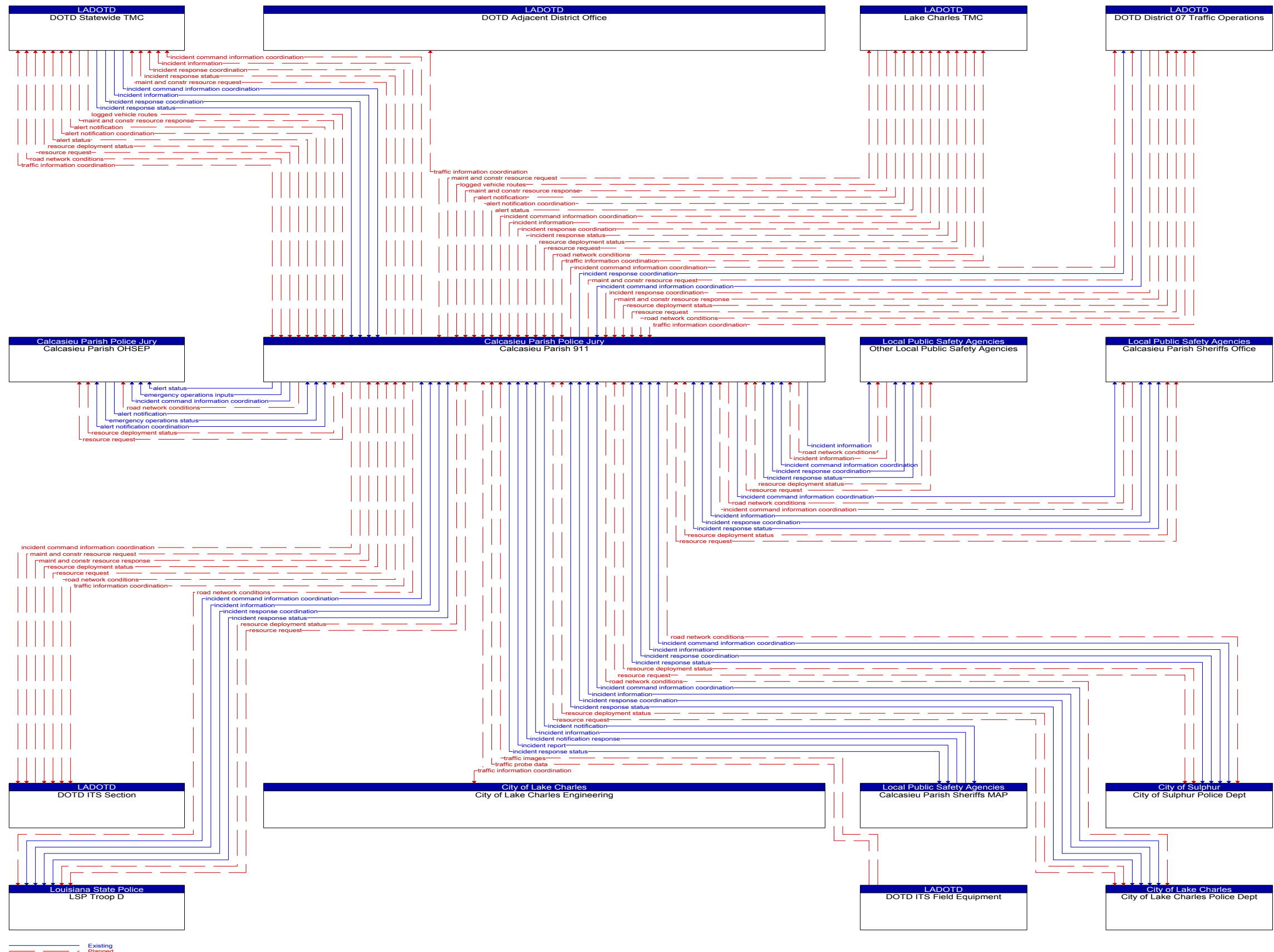


Figure 5: Calcasieu Parish 911 Context diagram

Notes: 1. Figures will be made available upon request to the DOTD ITS Section
2. See Appendix A for architecture flow descriptions.

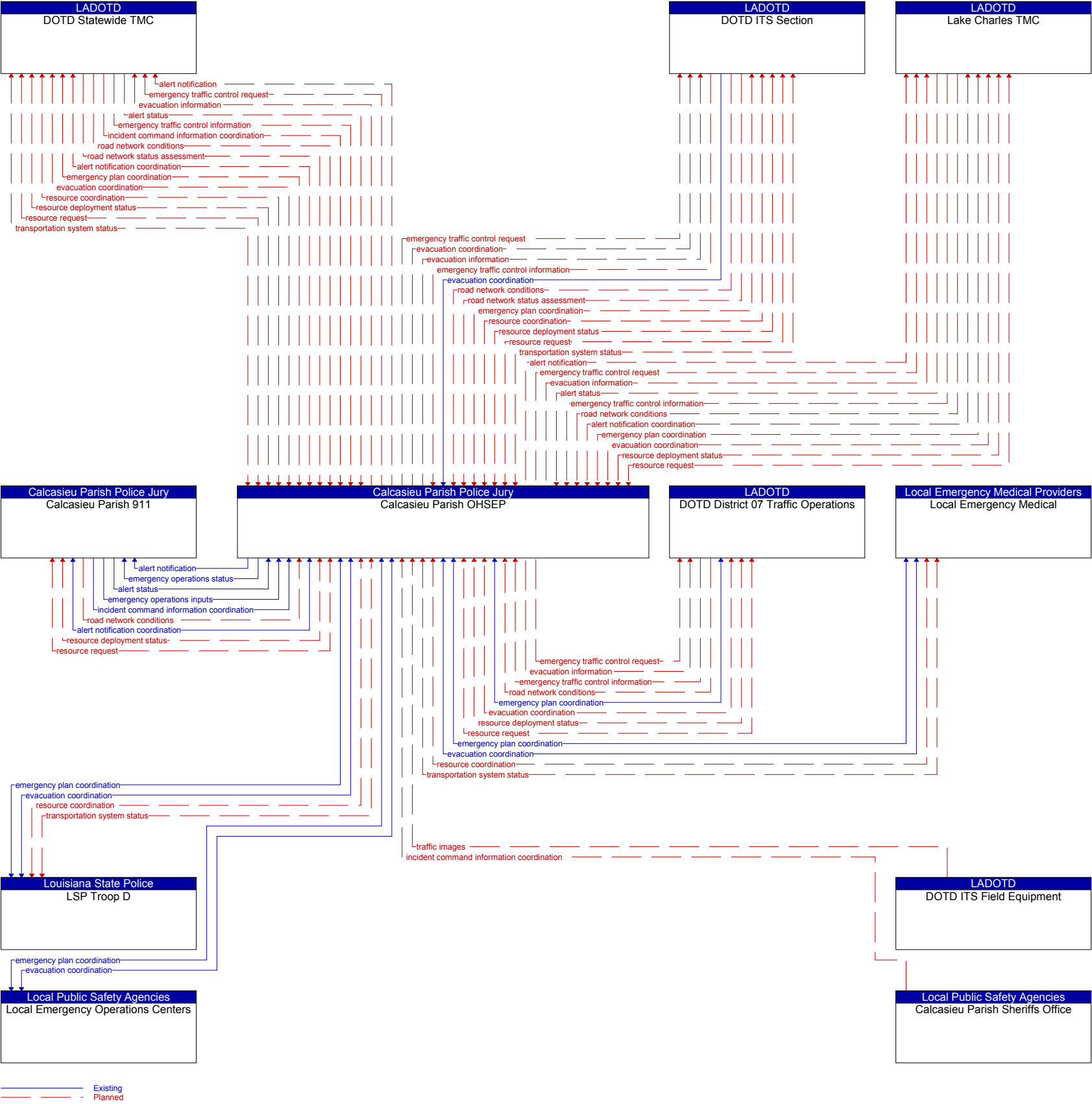


Figure 6: Calcasieu Parish OHSEP Context Diagram

Notes: 1. Figures will be made available upon request to the DOTD ITS Section
2. See Appendix A for architecture flow descriptions.

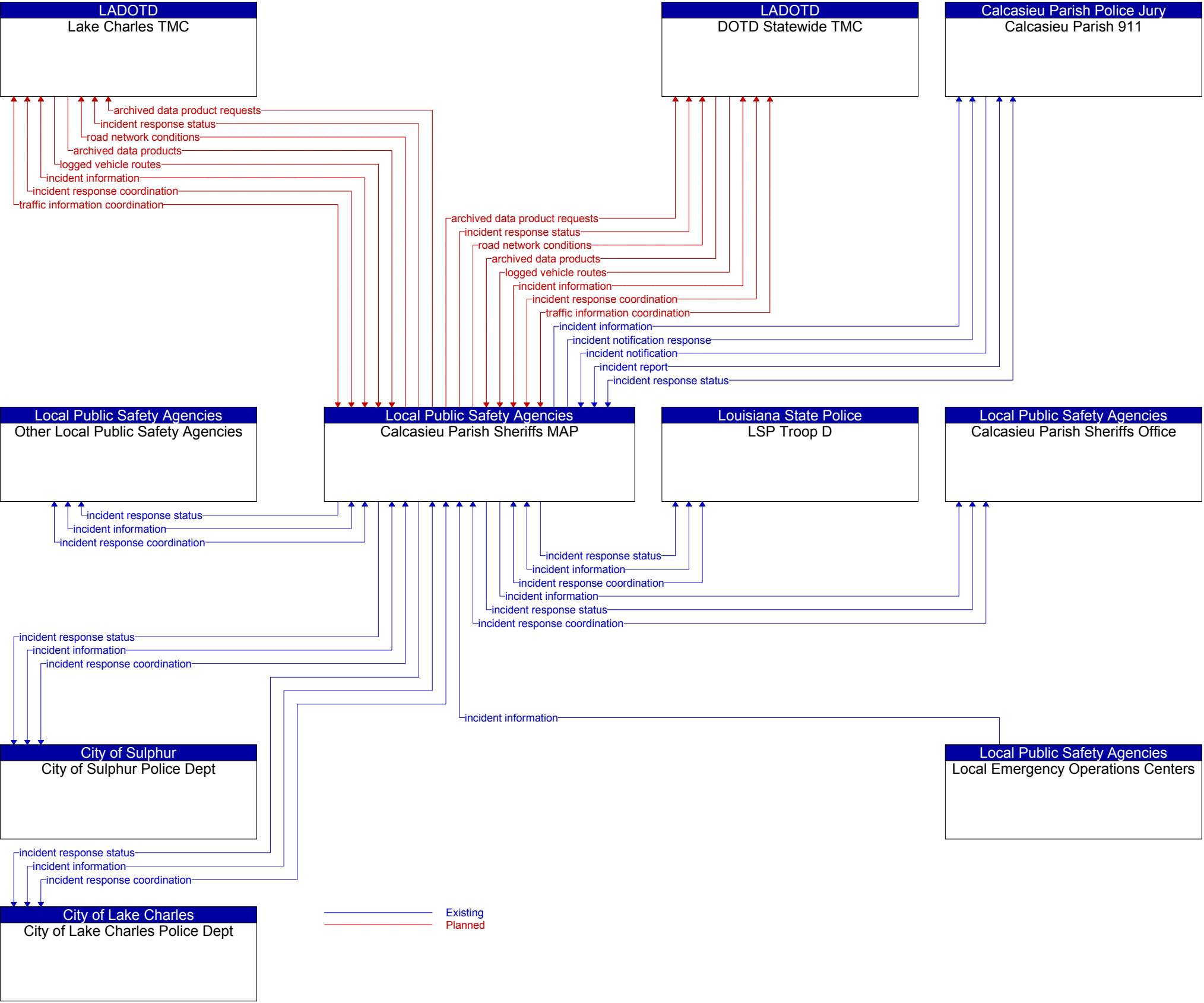


Figure 7: Calcasieu Parish Sheriff's MAP Context Diagram

Notes: 1. Figures will be made available upon request to the DOTD ITS Section
2. See Appendix A for architecture flow descriptions.

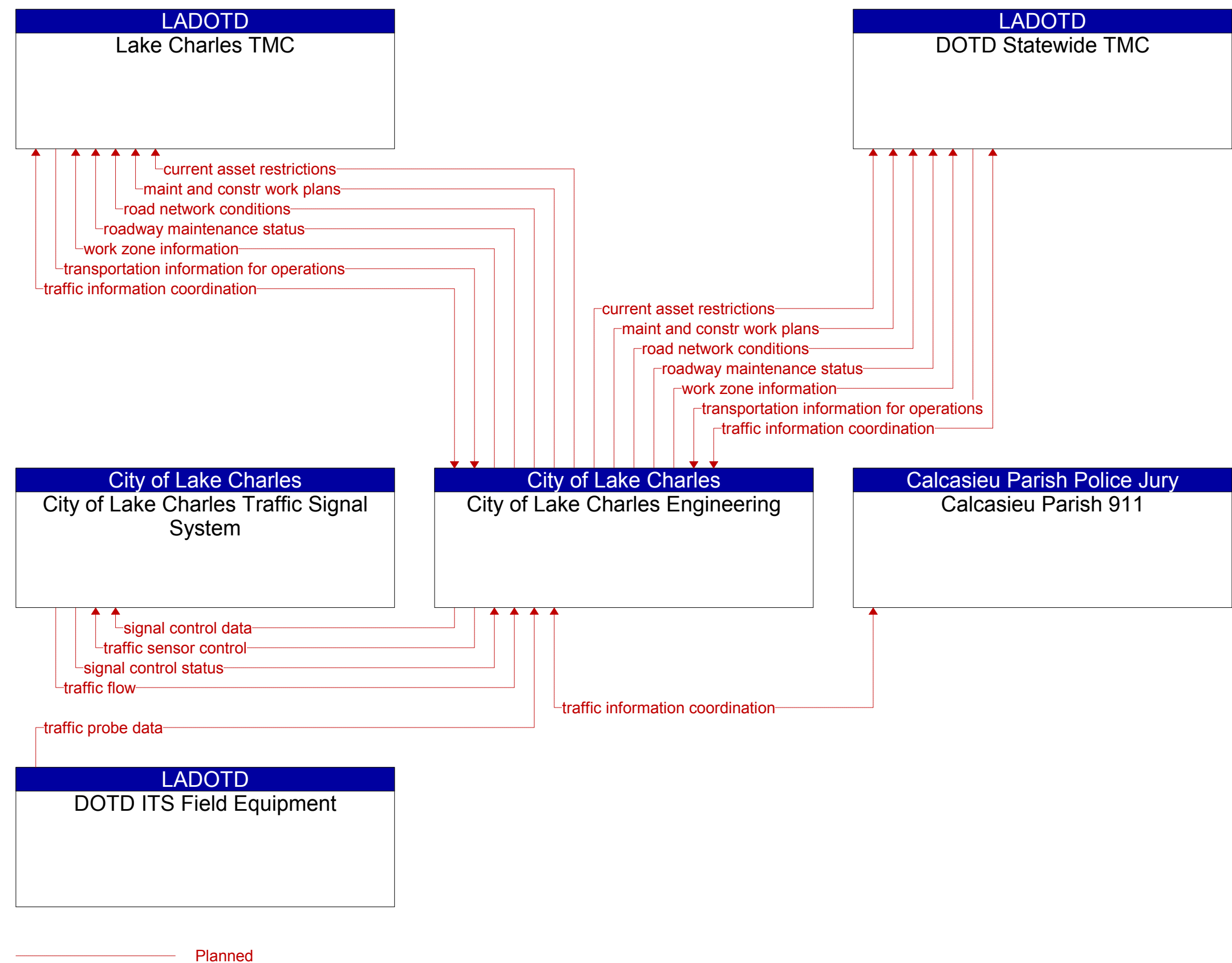


Figure 9: Lake Charles Engineering Context Diagram

Notes: 1. Figures will be made available upon request to the DOTD ITS Section
 2. See Appendix A for architecture flow descriptions.



Figure 10: City of Lake Charles Police Department Context Diagram

Notes: 1. Figures will be made available upon request to the DOTD ITS Section
2. See Appendix A for architecture flow descriptions.

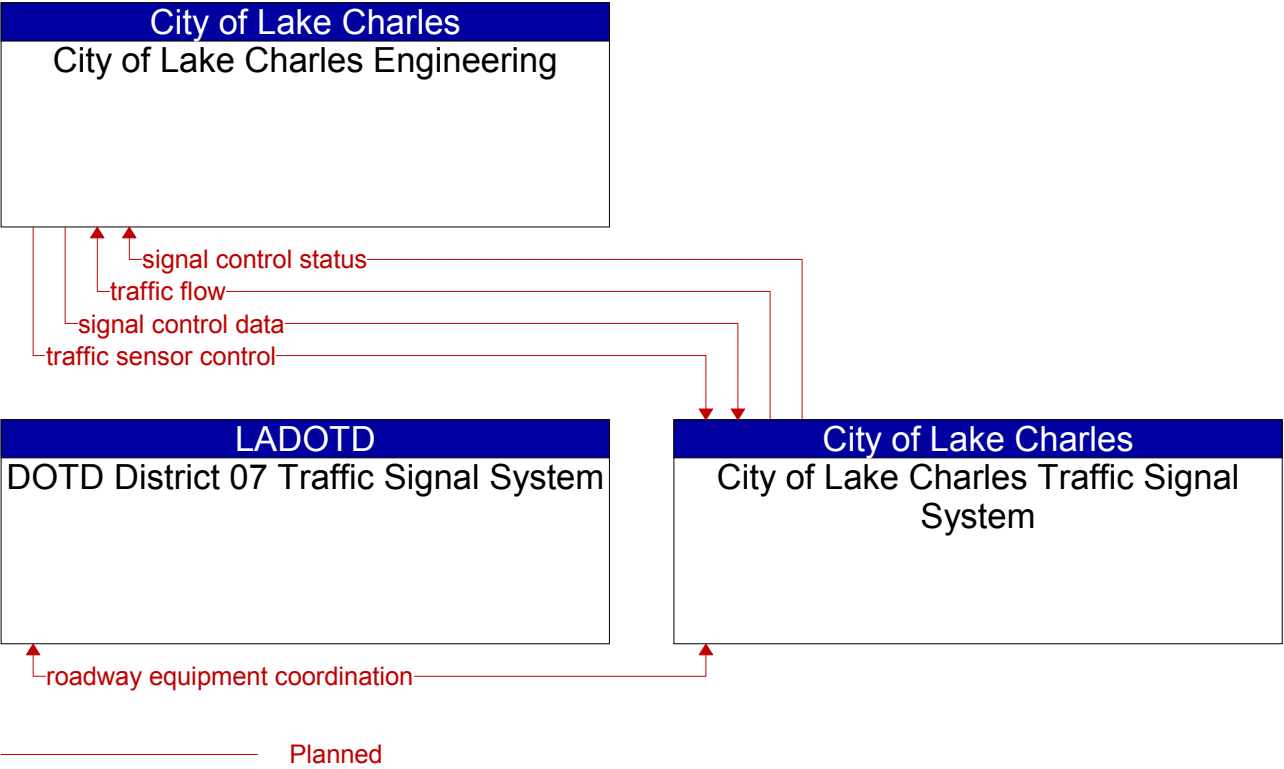


Figure 11: City of Lake Charles Traffic Signal System Context Diagram

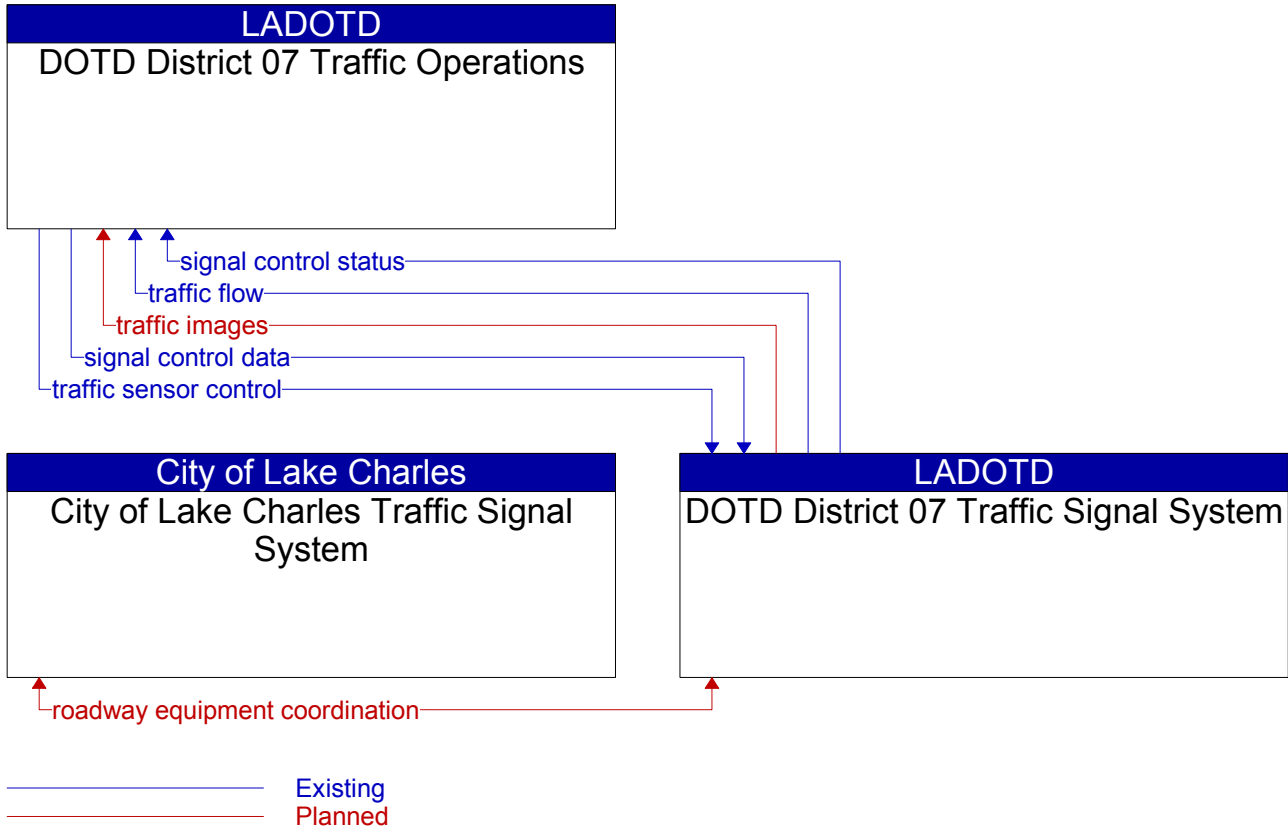


Figure 12: DOTD District 07 Traffic Signal System Context Diagram

Notes: 1. Figures will be made available upon request to the DOTD ITS Section
2. See Appendix A for architecture flow descriptions.

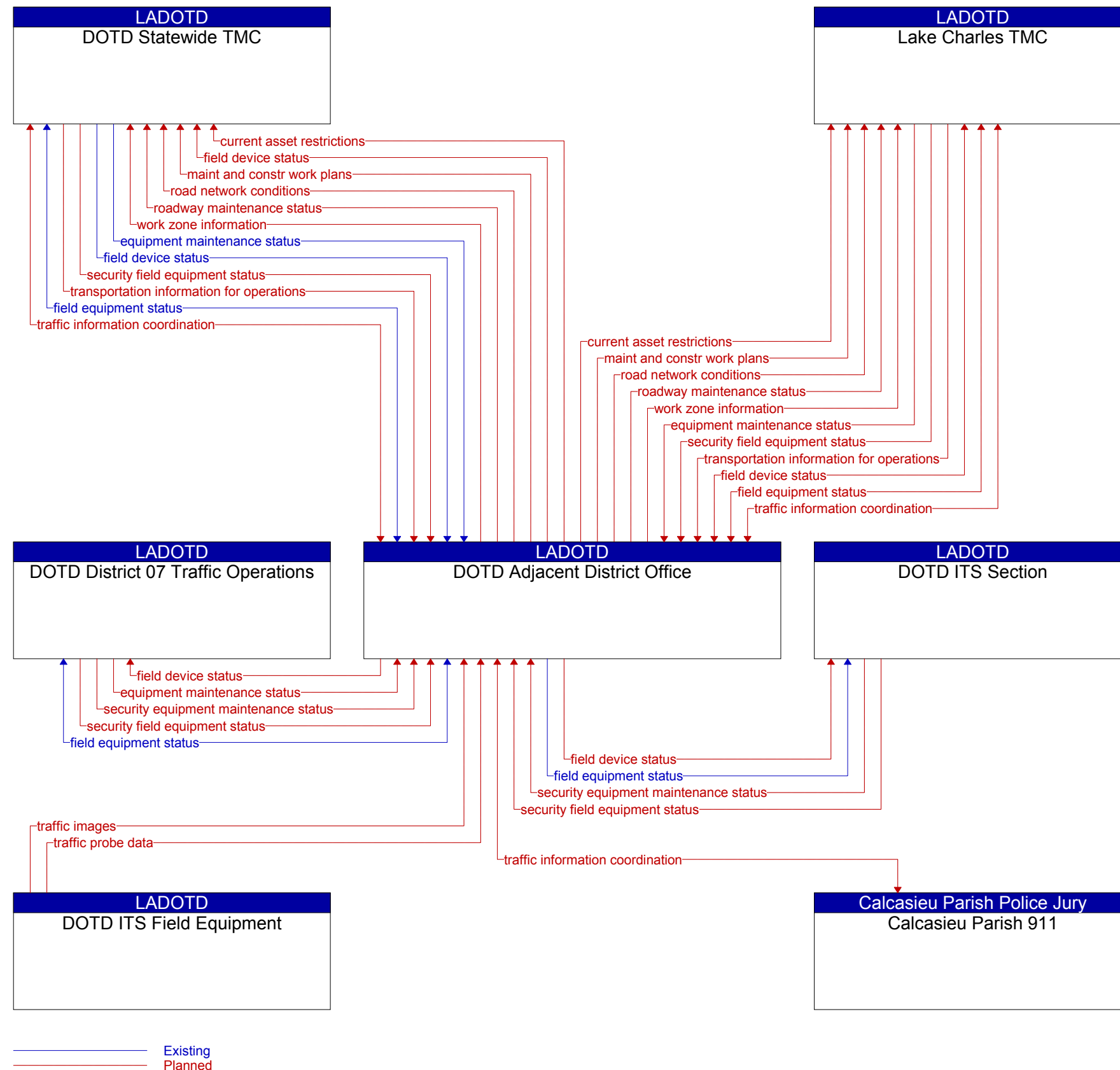


Figure 14: DOTD Adjacent District Office Context Diagram

Notes: 1. Figures will be made available upon request to the DOTD ITS Section
2. See Appendix A for architecture flow descriptions.

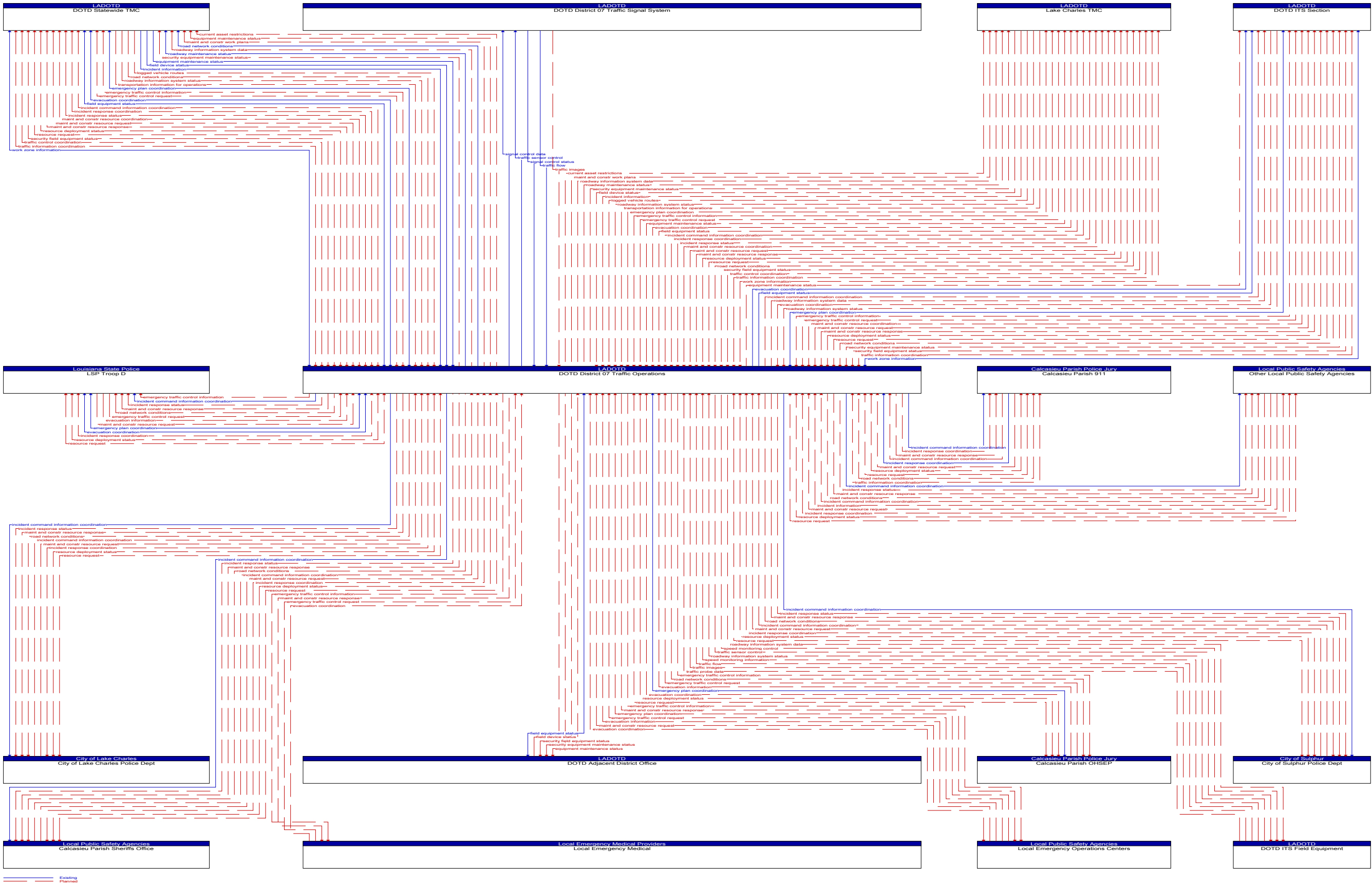


Figure 15: DOTD District 07 Traffic Operations Context Diagram

Notes: 1. Figures will be made available upon request to the DOTD ITS Section
2. See Appendix A for architecture flow descriptions.

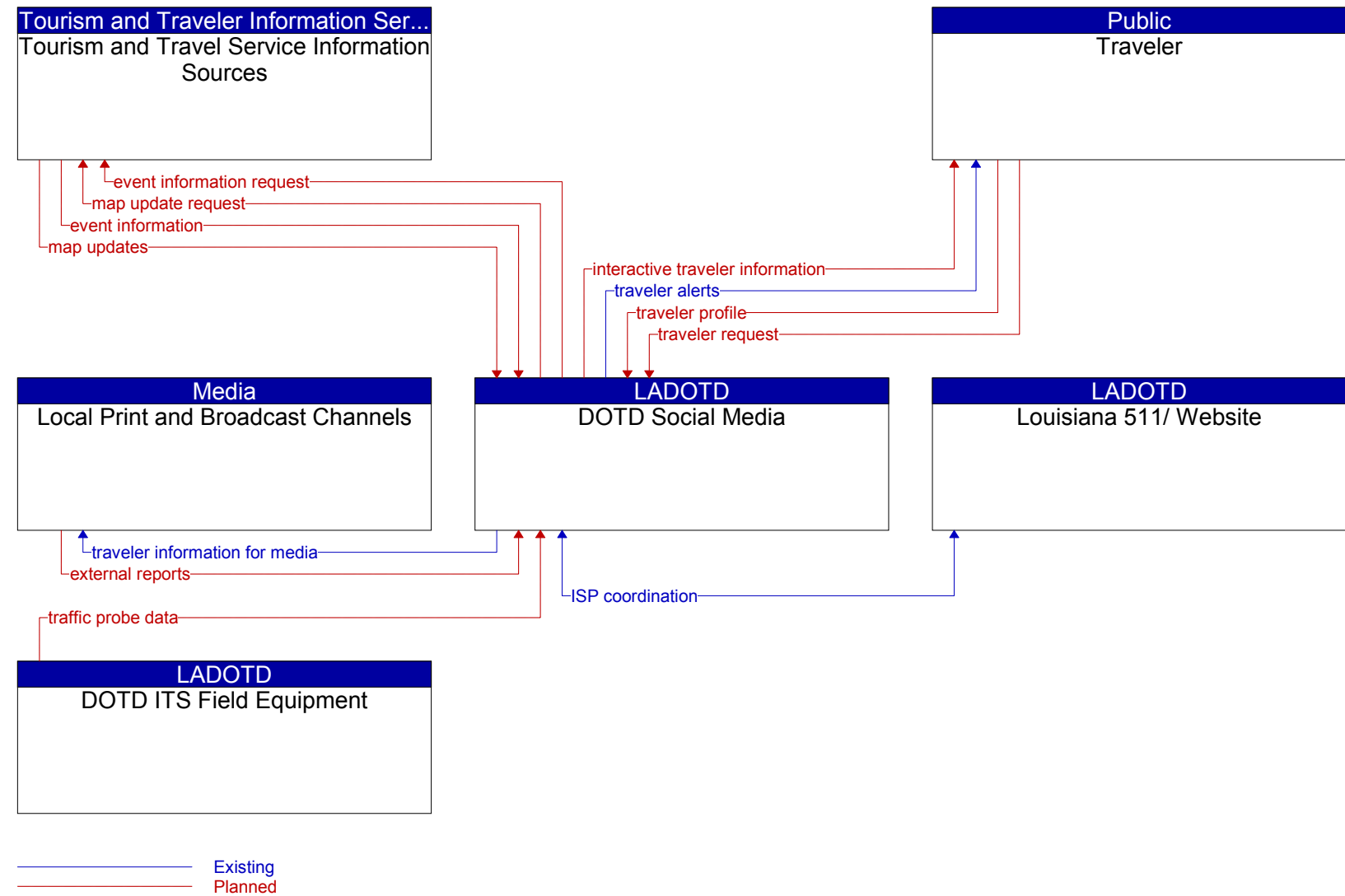


Figure 18: DOTD Social Media Context Diagram

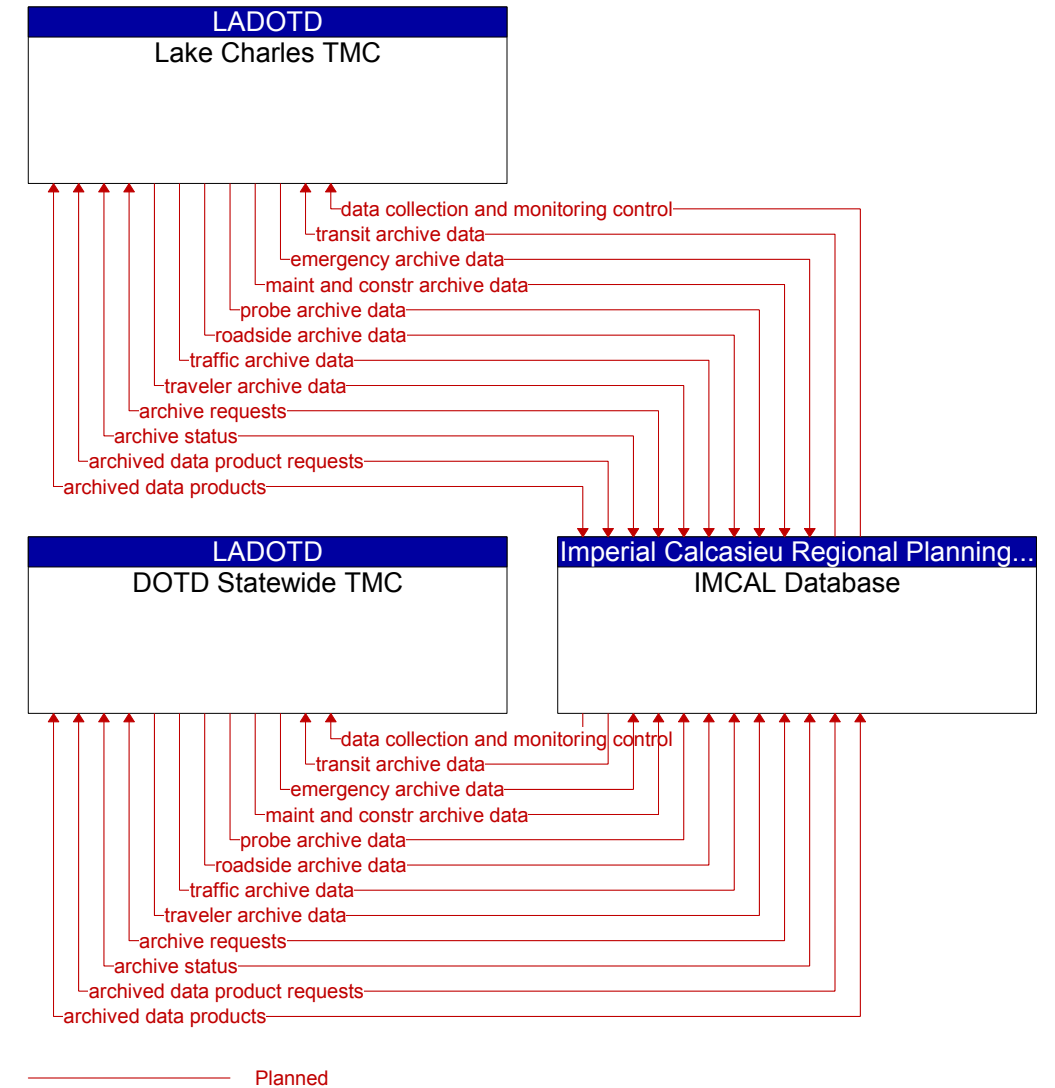


Figure 19: IMCAL Database Context Diagram

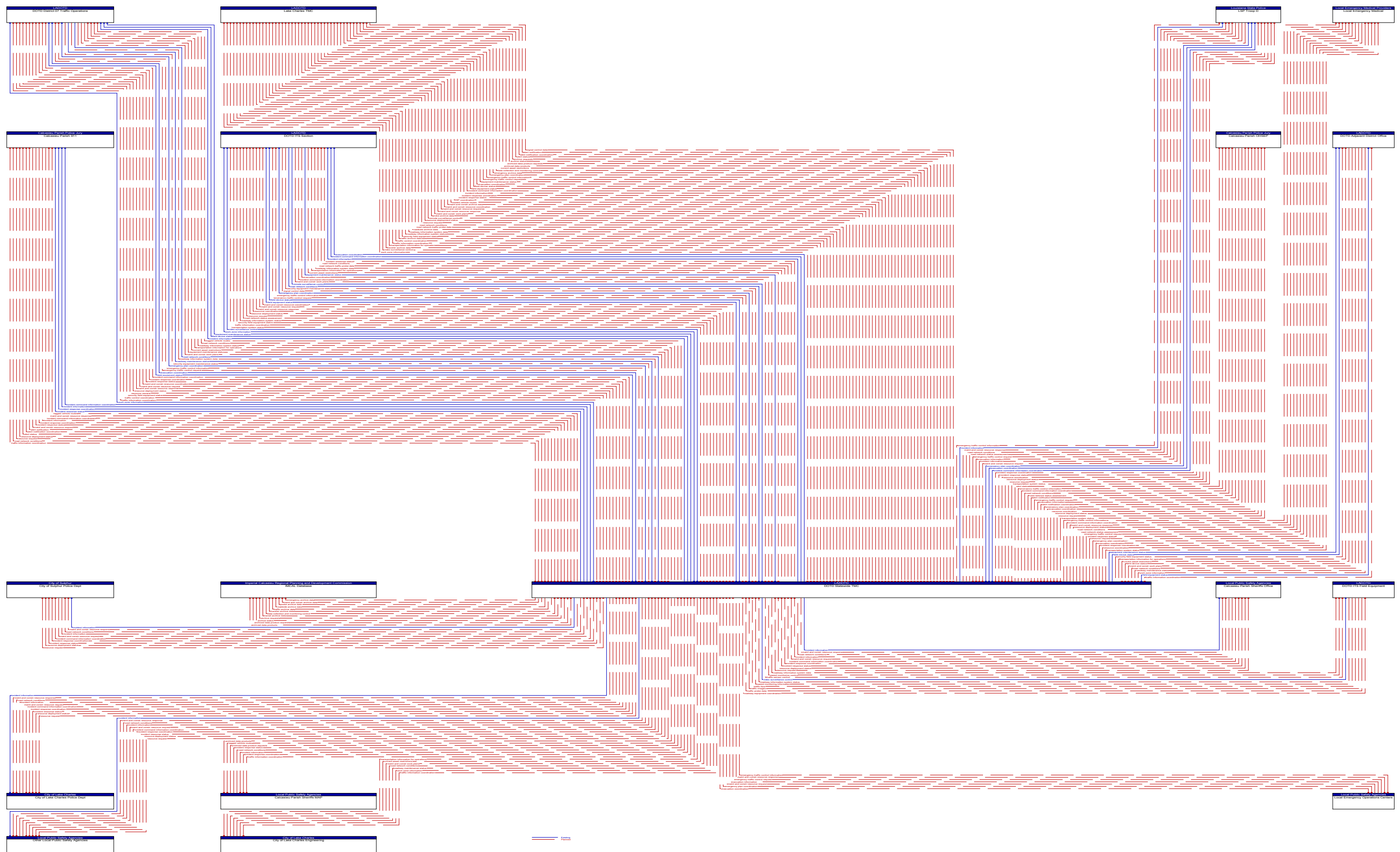


Figure 20: DOTD Statewide TMC Context Diagram

Notes: 1. Figures will be made available upon request to the DOTD ITS Section
2. See Appendix A for architecture flow descriptions.

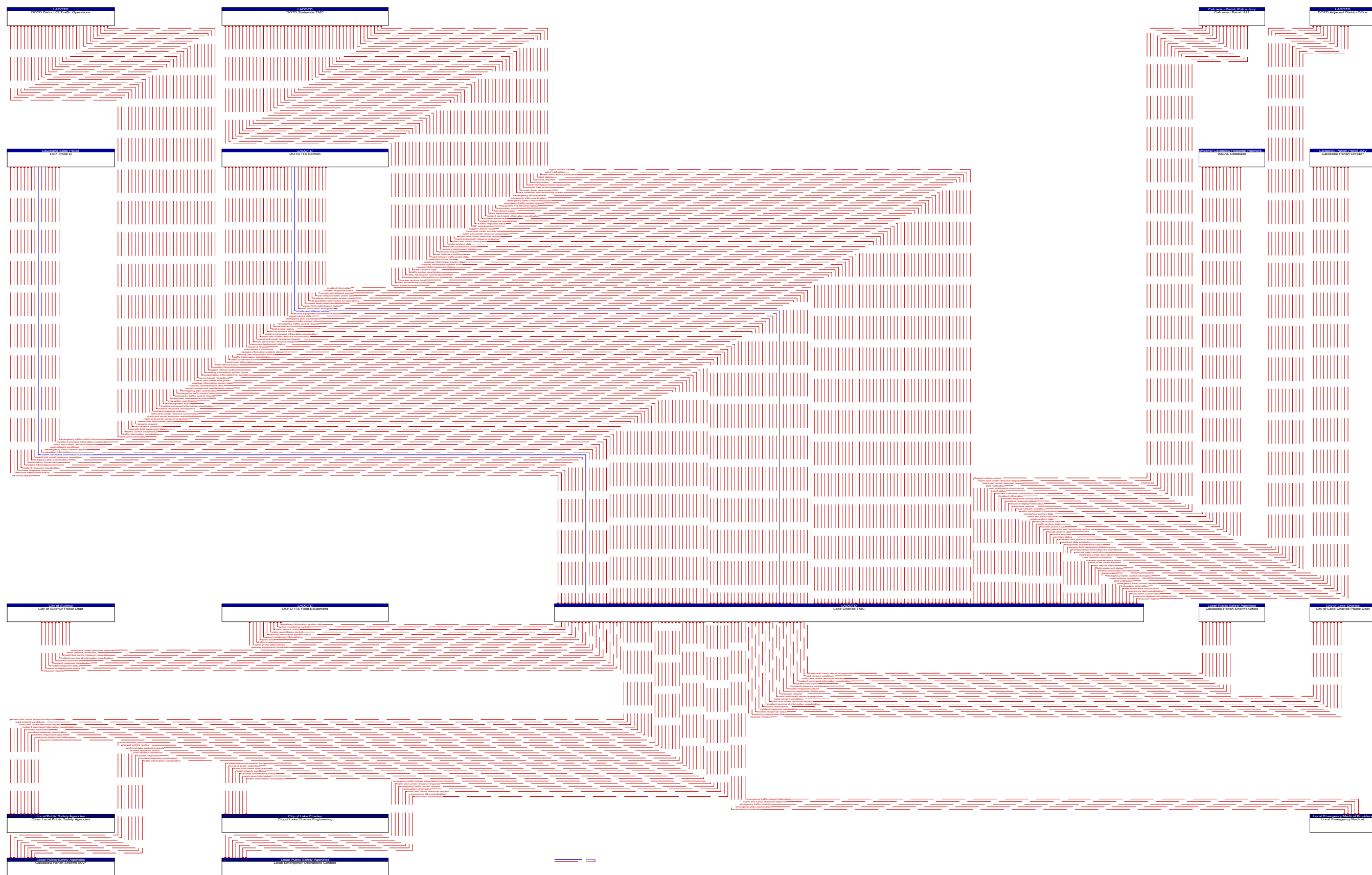


Figure 21: Lake Charles TMC Context Diagram



Figure 22: Local Emergency Medical Context Diagram

Notes: 1. Figures will be made available upon request to the DOTD ITS Section
2. See Appendix A for architecture flow descriptions.



Figure 23: Local Emergency Operations Center Context Diagram

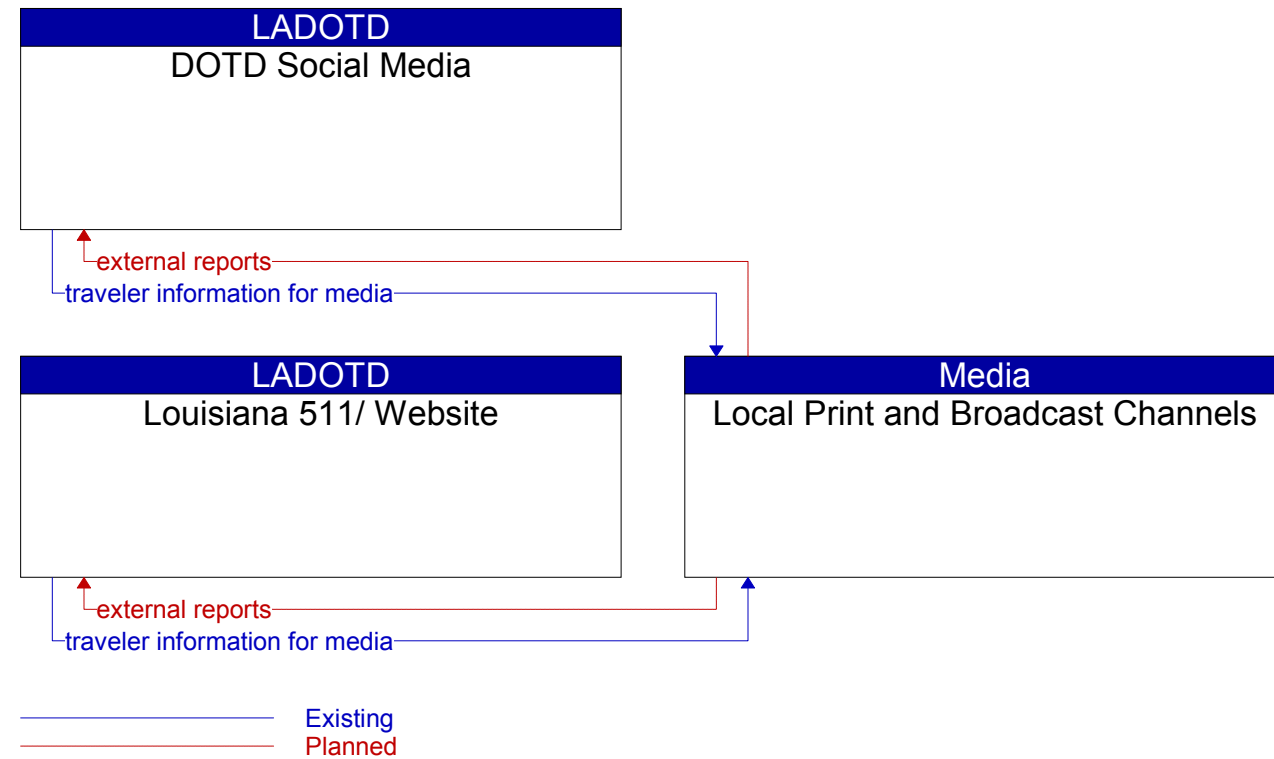


Figure 24: Local Print and Broadcast Channels Context Diagram

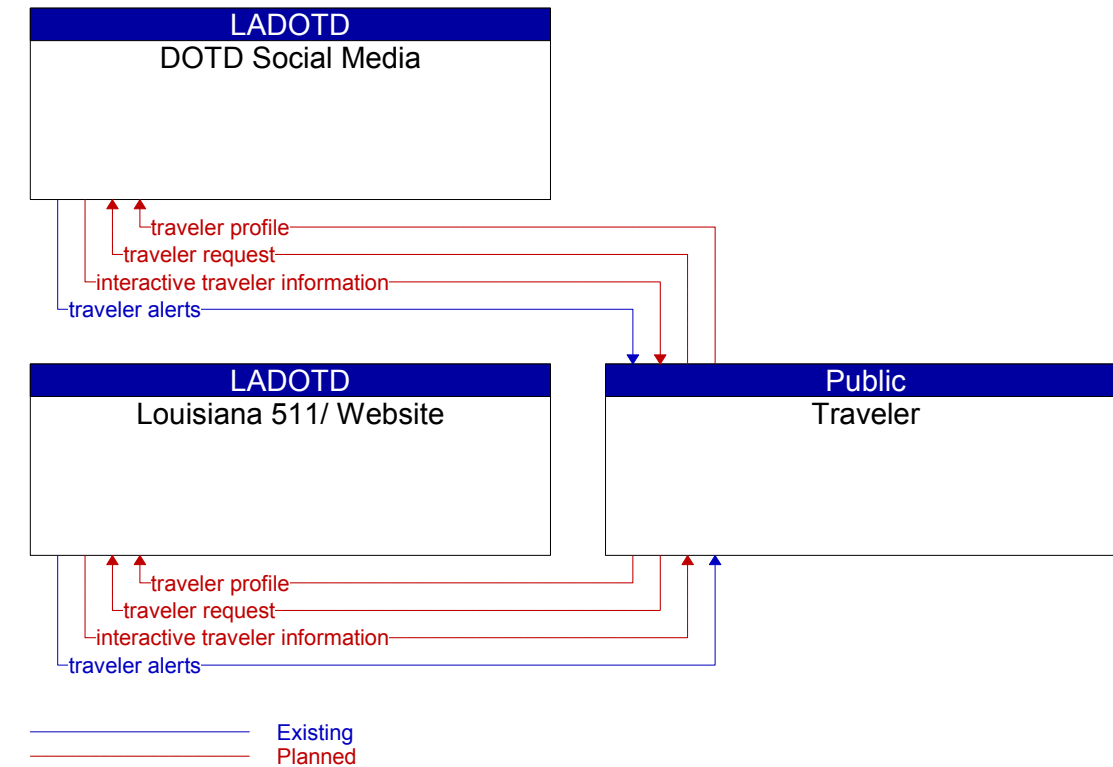


Figure 25: Traveler Context Diagram

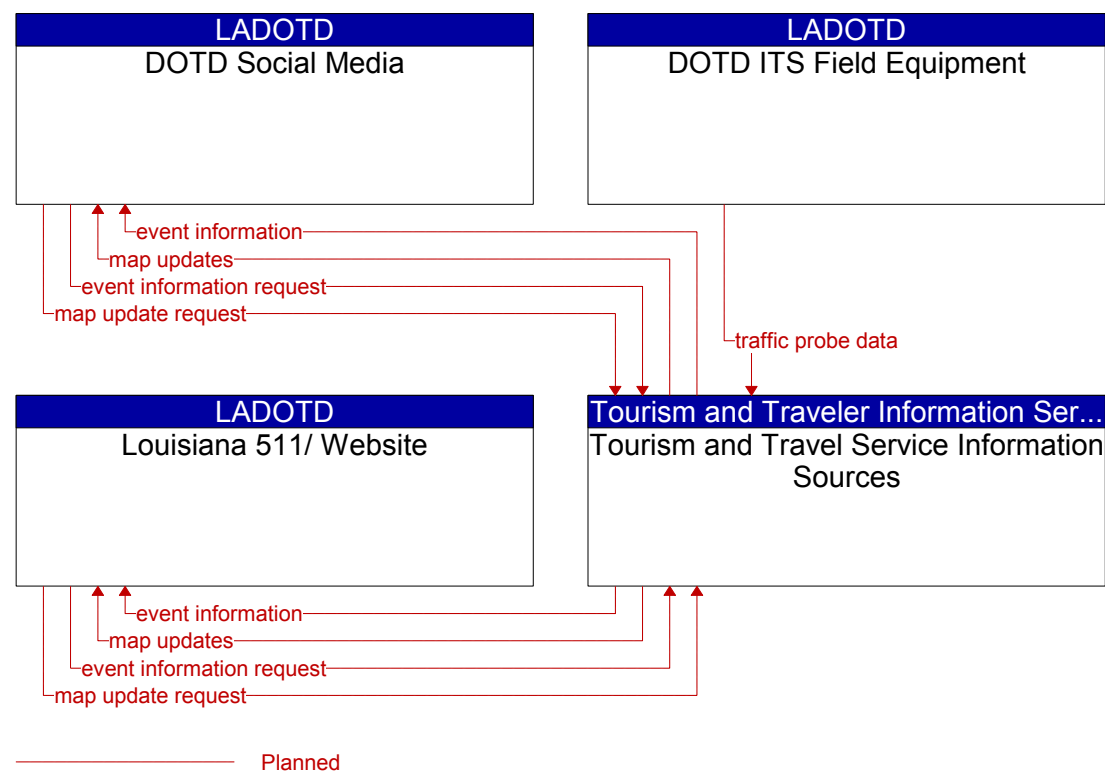


Figure 26: Tourism and Travel Service Information Source Context Diagram

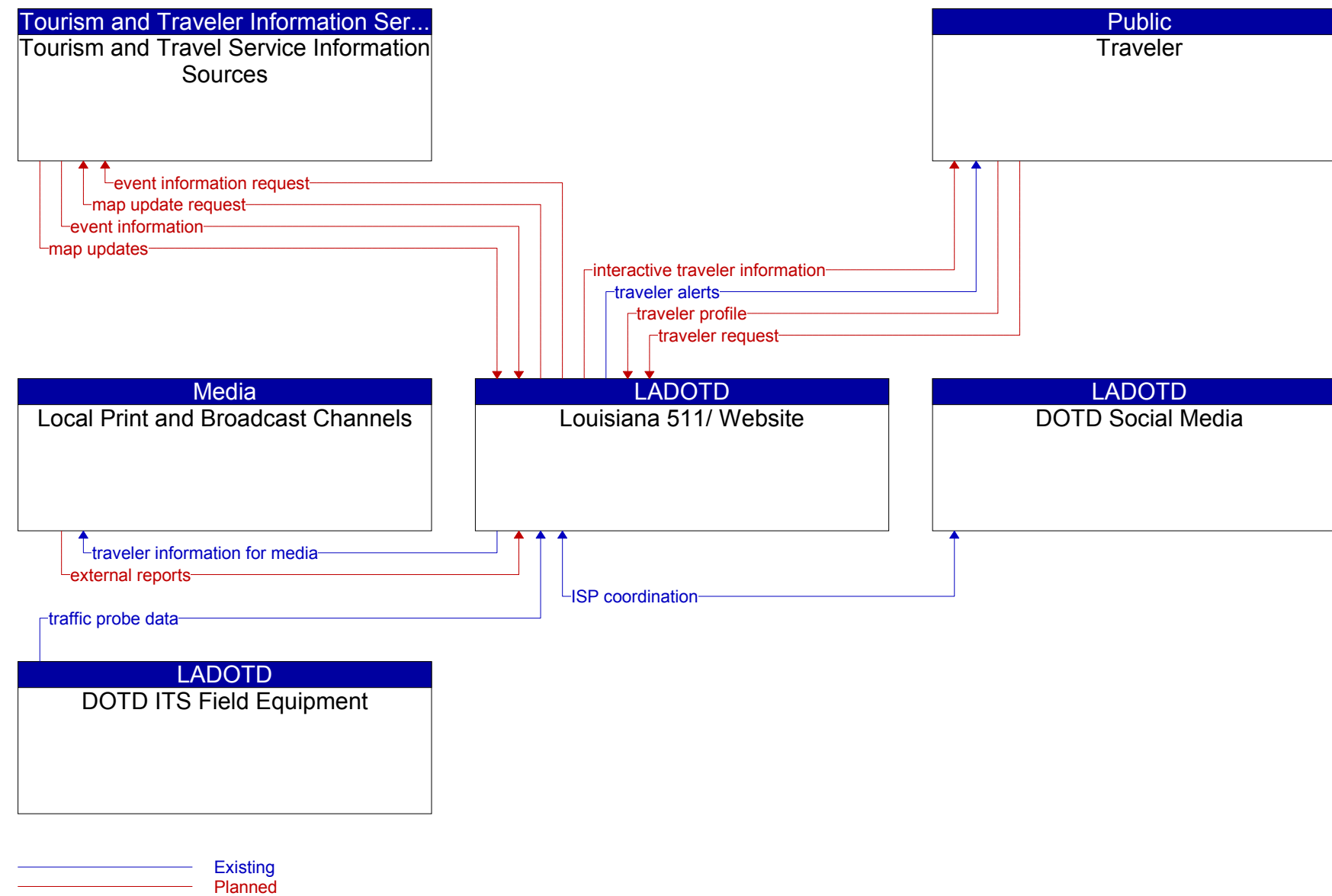


Figure 27: Louisiana 511/Website Context Diagram

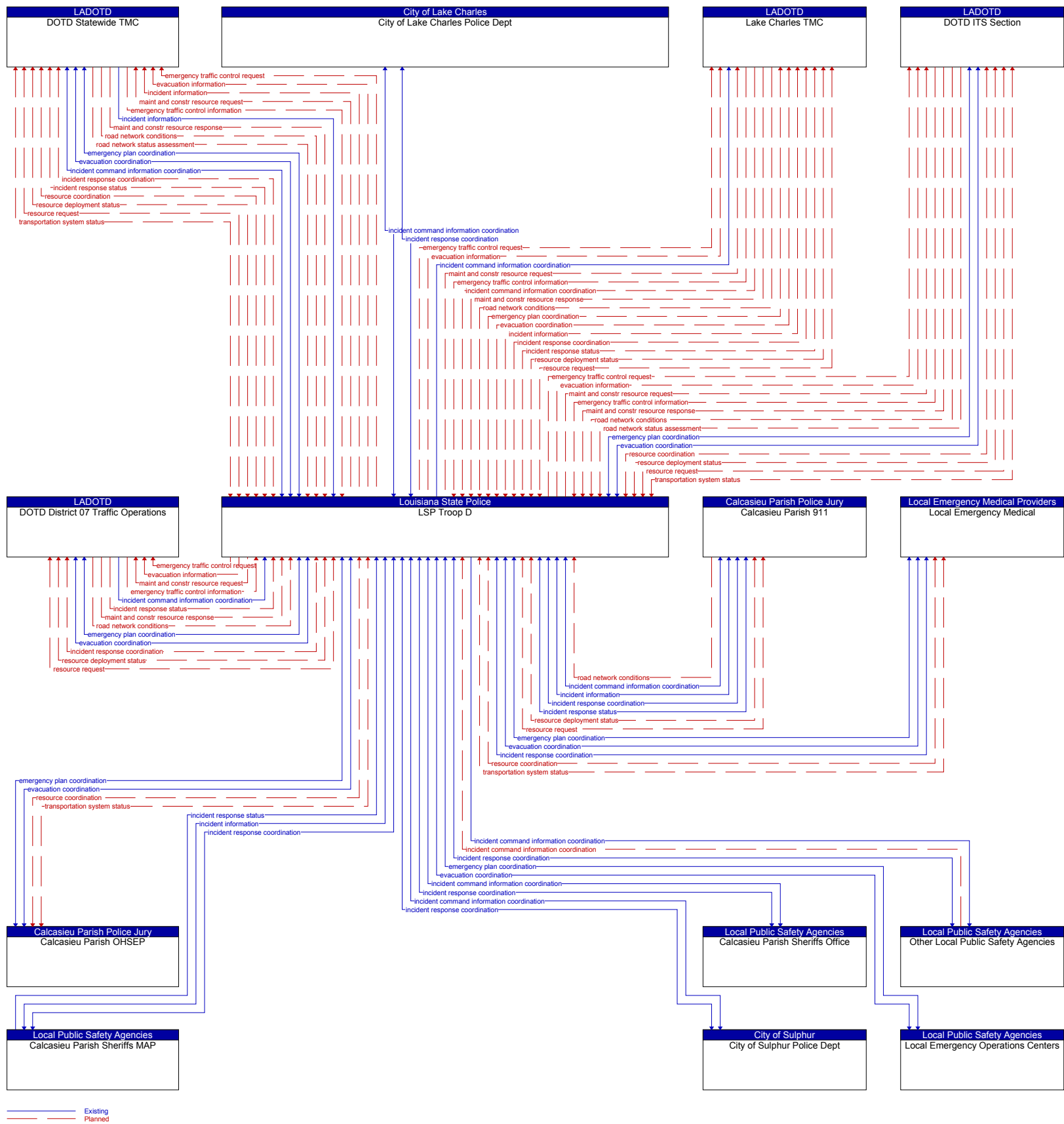


Figure 28: LSP Troop D Context Diagram

Notes: 1. Figures will be made available upon request to the DOTD ITS Section
 2. See Appendix A for architecture flow descriptions.

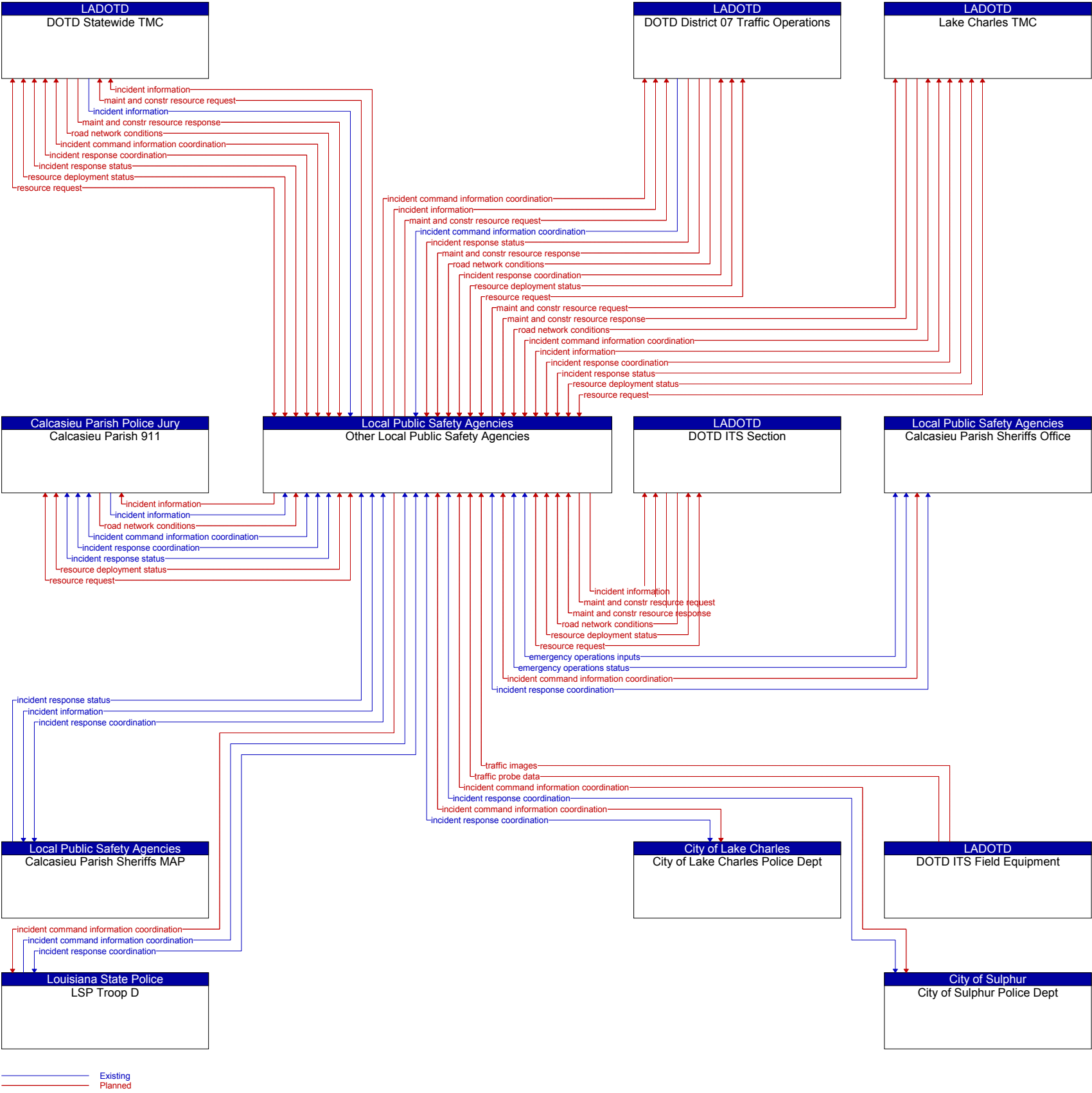


Figure 29: Other Local Public Safety Agencies Context Diagram

Notes: 1. Figures will be made available upon request to the DOTD ITS Section
2. See Appendix A for architecture flow descriptions.

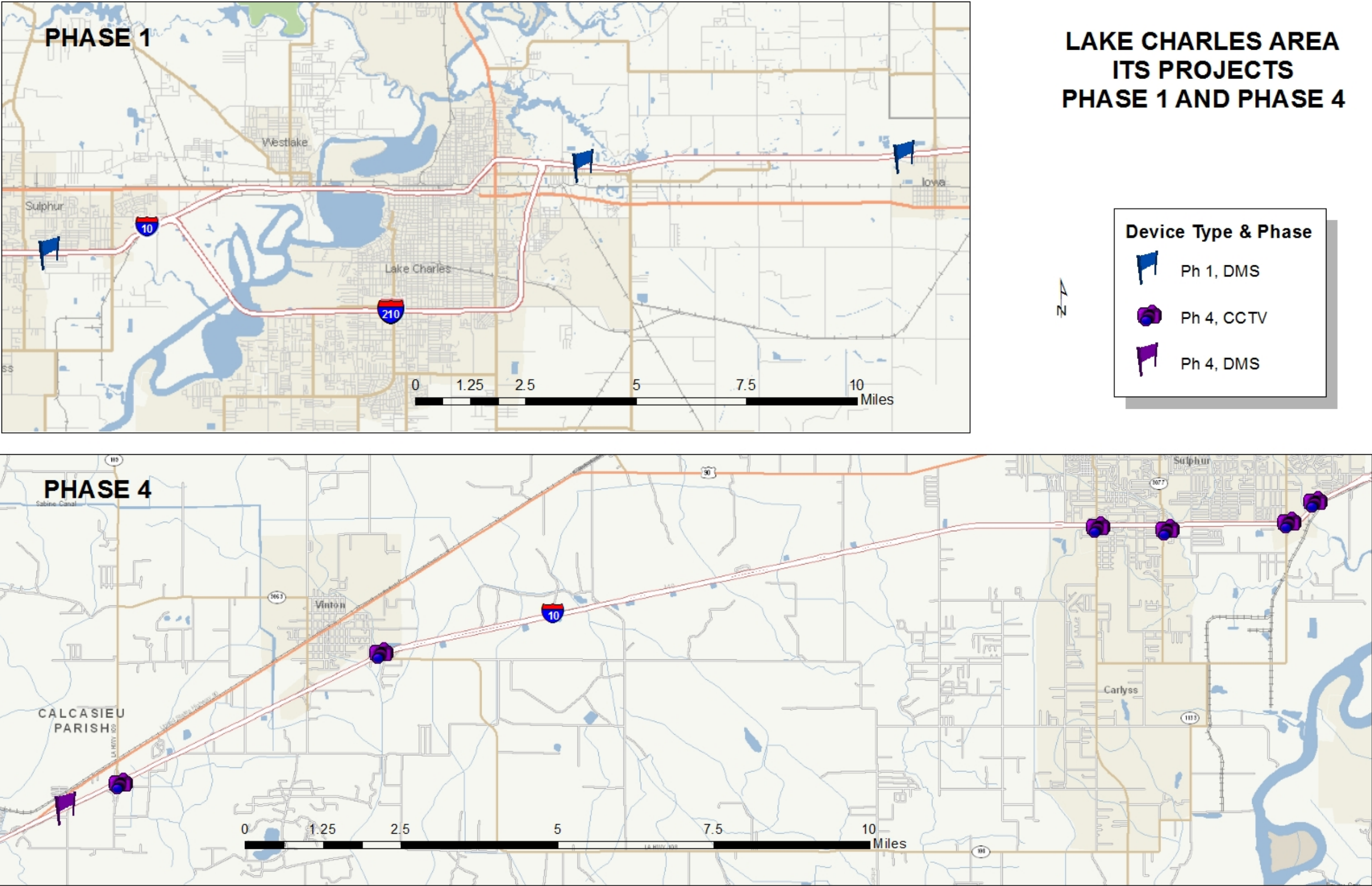


Figure 30: ITS Deployments Phases 1 & 4

Note: Figures will be made available upon request to the DOTD ITS Section

LAKE CHARLES AREA ITS PROJECTS PHASE 2 AND PHASE 3

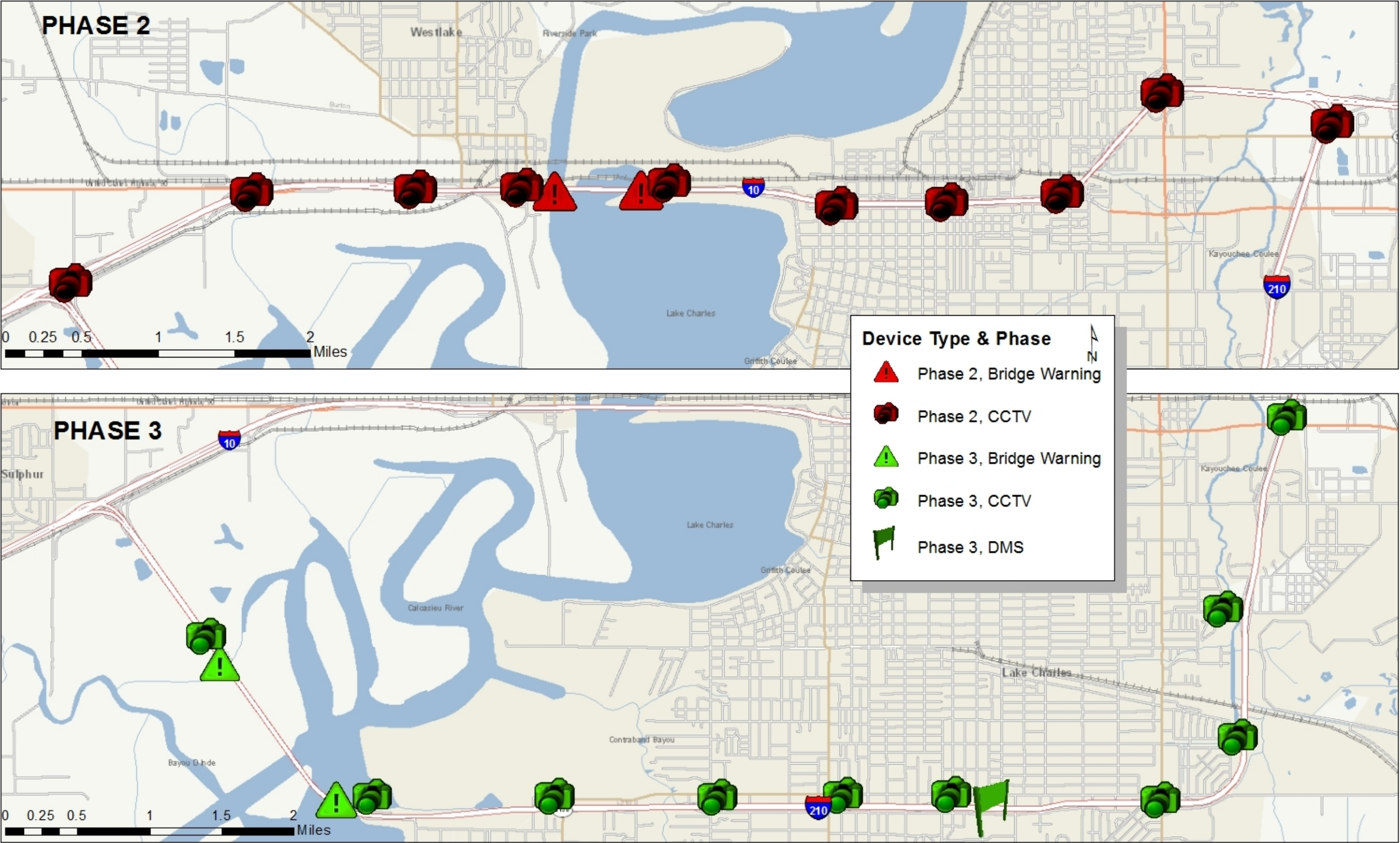


Figure 31: ITS Deployments Phases 2 & 3

Note: Figures will be made available upon request to the DOTD ITS Section